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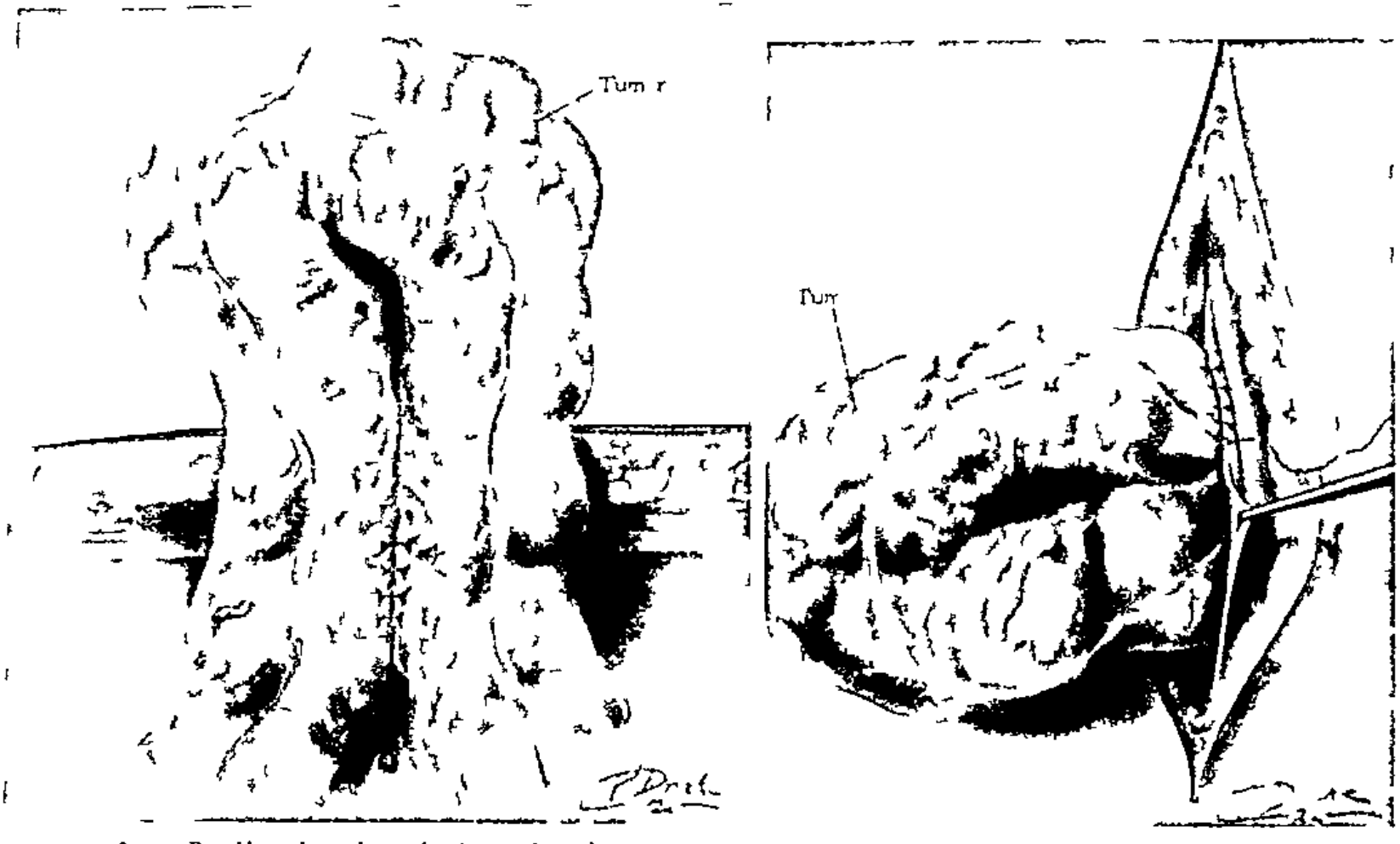
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SURGERY, GYNECOLOGY AND OBSTETRICS

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THE TWO-STAGE MIKULICZ OPERATION FOR CANCER OF THE SIGMOID

BY CHARLES H MAYO M D F A C S AND WALTMAN WALTERS M D ROCHESTER MINNESOTA
Mayo Clinic

DESCRIPTIONS of the two stage Mikulicz method of removing cancer of the sigmoid and descending colon are singularly lacking in the standard textbooks of surgery yet few operations for cancer of the large intestine are simpler have a lower mortality rate or offer so good a chance of complete cure Particularly is this true since experience has developed improved technical methods greatly reducing the mortality and extending operability

A discussion of the comparative value of various types of operation should be based on the operability mortality permanency of cure and morbidity

End to end or lateral anastomosis in a one stage operation has given excellent results both immediate and remote in selected cases in which the patient is in good condition with little if any obstruction and in which the mesosigmoid does not contain a large amount of fat so that the peritoneum will readily close the mesenteric gap leaving no non peritonized spaces at the site of anastomosis If a primary operation is performed a tube should be passed from the anus through the lower end of the cut intestine extending 10 or 15 inches above the anastomosis A large stomach tube which makes a curve rather than a kink is the most efficient This prevents hardened masses of faces from exerting pressure on the suture line from gas distention Primary resection usually the tube method of Balfour has been applicable in but sixteen of such cases admitted to St Mary s Hospital during the last 4 years

It was found in the Clinic that any attempt to go beyond the indications of primary operation has resulted in a high mortality the patient develops late peritonitis and progressive sepsis which results in pulmonary complications Consequently there was a tendency to reduce operability very greatly Unfortunately the large majority of patients with cancer of the large intestine are in the last decades of life in poor general condition not infrequently obese and often have more or less intestinal obstruction

Operability Improvements in technical methods extend operability without increasing mortality Certain patients are alive and well today in whom two or three separate loop of small intestine were adherent to the growth requiring simultaneous resection Several of these patients also had portions of the bladder removed One such patient is alive now 12 years after such a multiple operation Not infrequently it was found necessary to remove the uterus with the ovaries and tubes because of their involvement The extent to which these operations have been carried when there was no glandular or peritoneal metastasis has indeed been very great Most interesting in this connec

tion are several cases in which the left ureter was hopelessly involved in the growth and a section excised the two ends of the ureter being tied with silk the kidney on that side undergoing passive atrophy without subsequent symptoms

Mortality and permanency of cure The septic contents of the colon invite peritonitis but the two-stage method of Mikulicz by permitting peritoneal adhesions to form before the lumen of the intestine has been opened has greatly reduced mortality especially if obstruction exists Between the years 1909 and 1920 inclusive this type of operation was performed in the Mayo Clinic on 152 patients with cancer of the sigmoid and rectosigmoid All but 8 of these patients were traced the 8 are therefore eliminated from the statistics although in our experience those patients not heard from show a higher average of recovery as pointed out also by Bloodgood

Fifty two of the patients are living and well with normal functioning gastro intestinal tracts and no evidence of recurrence An additional 37 patients have had from 2 to 7 years of postoperative life death occurring in many instances from conditions not connected with the cancer of the sigmoid In this connection it is well to remember that the normal death rate of persons 52 years of age the average age of the patients in this series is 2 per cent a year so that the patients who have died cannot definitely be said to have died from a recurrence of the disease These statistics are valuable if for no other purpose than to promote a more optimistic feeling in the profession with regard to the cure of cancer by operation and to counteract the pessimism engendered by many recent articles on the cure of cancer These end results support the splendid work of the Society for the Prevention and Cure of Cancer

Morbidity The history of various standard operations constantly shows a reduction of disability The best of many operations of equal mortality rate when tested by the gauge of disability is the one which gets the patient up and to work in the shortest possible time In this particular when subjected to scrutiny the two stage method of Mikulicz shows delayed healing with a total period of disability of from 4 to 8 weeks or longer occasionally followed by hernia usually not of serious grade which can be repaired and occasionally by a small fistula which is slow to close

Technique Hernia can be obviated at the time the colostomy opening which has been left open is closed As the inner wall of the intestine is united the attached ends can be dissected down deeply into the adhesions which have not disappeared and the anastomosed ends sunk well below the muscles and sutured transversely while the wound is sutured longitudinally A gap should be left in the suture line of the abdominal wall sufficient to permit the escape of gas and feces under pressure If the gap in the abdominal wound is filled with vaseline free drainage is permitted if necessary without interfering with primary healing

It is very important when the forceps are put on to bite out the spur making a large enough opening to prevent tension on the suture line In a considerable percentage of cases there is an escape of gas and feces from the incision at the end of the first week but this usually subsides readily We have tried constipating patients following the closure of the colonic opening and also the early use of laxatives On the whole a middle course has been found most satisfactory

Since the adoption of the method of sinking the intestine well below the level of muscle no fistulæ have formed Formerly the edges of skin and mucous membrane of the colon were not widely separated and the button method of closure was used

The high regard for the two-stage method of Mikulicz gives it a dignified position in surgery The various steps of the operation as published by W J Mayo in 1907 are as follows

Resection for obstruction between the splenic flexure and the rectum should usually be made in two stages on account of the solid nature and septic character of the feces and the lack in many cases in this region of a good peritoneal covering The cause of the obstruction is most frequently new growth or extensive inflammatory disease such as di

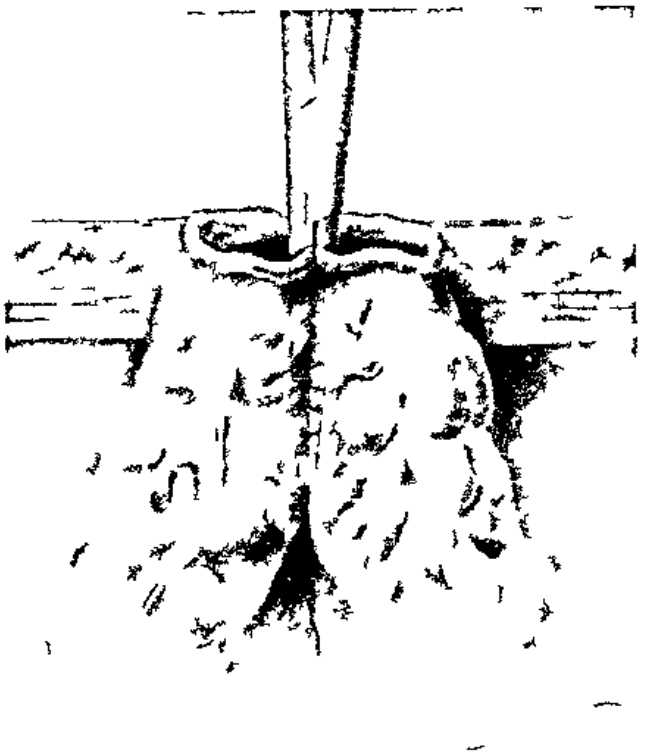


Fig 3 Crushing forceps in place

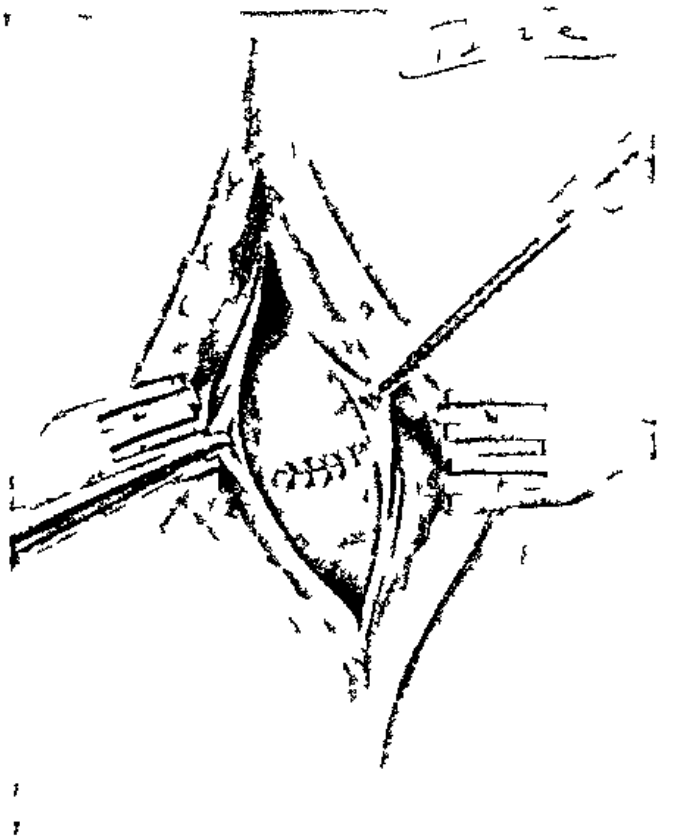


Fig 4 Last stage showing the closure of the bowel

verticulitis Immediate end to end or lateral union may be advisable when there is no obstruction especially in that part more completely invested with peritoneum but if there is obstruction the complete primary operation is often fatal It is far better to follow the method of Mikulicz as introduced and early practiced by C H Mayo which consists in drawing the affected part out of the abdomen after separating the mesentery and suturing the two limbs together (Fig 1) attaching it to the abdominal incision with the diseased part projecting beyond the skin (Fig 2) After waiting as long as the condition of the patient will permit for adhesions to protect the wound the obstruction may be relieved by a small opening in the distended loop In from 4 to 8 days the entire projecting area is cut away leaving the two end of the colon flush with the skin side by side like a double barreled shot gun At the end of weeks a long bladed forceps is introduced one blade in each opening and made to grasp the opposed walls of the intestine where they are held by sutures for a distance of not less than 8 75 centimeters (Fig 3) The clamps are gradually tightened until they cut their way through which takes from 4 to 6 days sometimes the forceps bite may be short and may have to be repeated This re establishes the communication The fistula gradually contracts and will either close itself or can readily be closed by a secondary extra peritoneal operation

This classical description is so complete that little needs to be added Certain modifications have extended the scope of the operation to a group of cases which heretofore have been considered hopeless One of the serious objections to this operation in the earlier days was the fact that the bowel was allowed to heal in the wound before being opened and therefore in acutely obstructed cases the two stage operation was regarded unfavorably Paul of Liverpool modified the operation by cutting out the tumor at the first operation and leaving the proximal end of the colon about 7 5 centimeters long in which a tube was fastened to conduct the contents to a container Bevan justly calls attention to the safety of a primary colostomy showing that if the bowel is carefully sutured into the

wound it can be safely opened at once without danger of infecting the peritoneal cavity

It has been the practice in the Clinic to remove the portion of the bowel containing the tumor at the primary operation whenever it could not be elevated above the incision or its circulation was so seriously interfered with that gangrene was to be expected as it was noted in certain of these cases that septic thrombi progressed deeply resulting in peritonitis Also if the lower fragment is very short the growth is cut away at once The two ends of the bowel are then clamped the clamp on the lower part being used as a temporary elevator and left in place until it comes away itself by which time the lower fragment has attached itself with sufficient strength to remain in the lower angle of the wound In a number of instances in which the cancer was very low in the sigmoid the entire rectum was loosened up to the levator ani muscle and by the forceps method the upper end of the rectum was maintained in position the peritoneum of the lower pelvis being obliterated by sutures and a pack of vaseline iodoform gauze introduced about the forceps The pace in the hollow of the sacrum was drained by a right lateral stab wound An opening can be made in the proximal fragment above the clamp at any time to relieve the pressure of gas and so forth Ultimate closure of the sigmoid ends is made extraperitoneally or if necessary by the tube method of Balfour (Fig 4)

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INTRAMENINGEAL DIVISION OF THE SPINAL ACCESSORY AND ROOTS OF THE UPPER CERVICAL NERVES FOR THE TREATMENT OF SPASMODIC TORTICOLLIS

By KENNETH G McKENZIE M B Toronto
Formerly Assistant Resident Surgeon Peter Bent Brigham Hospital

THE treatment of spasmodic torticollis surgical or otherwise has always been difficult and unsatisfactory The French physician Rabelais in the sixteenth century was familiar with the malady and probably first used the term torticollis He is said to have stated I hate these people worse than death No doubt he was exaggerating his feelings but most surgeons even today dread to see a case of intractable torticollis enter the clinic In view of this fact any new ideas or procedures regarding the treatment of the disorder should be welcomed

It is the main purpose of this paper to describe what we believe to be a hitherto untried operative procedure which has given a large measure of relief to a patient afflicted with spasmodic torticollis

P B B H Surgical No 18028 The patient Mrs D a married woman 51 years of age consulted Dr Cushing January 19 1923 She complained of her head being drawn to the right and such severe pain in the right suboccipital region that life was becoming unbearable

History About 5 years previously she first became conscious of a fine tremor of her head which persisted and became increasingly noticeable especially when she was overtired There probably was a certain amount of spasm even during this early period because she had noticed for at least 3 years that the right sternomastoid was becoming prominent also by that time (3 years ago) a spasmodic pain in the right suboccipital region was becoming her chief complaint

Painful spasms in the muscles on the right side of the neck during which her occiput has become more and more drawn down to the right have since then steadily increased in frequency and intensity Fortunately these spasms largely disappeared on recumbency and did not interfere with her sleep They did however interfere greatly with her usual activities and of late she had been unable to sit up for more than a few minutes at a time without the occurrence of a most painful rhythmic spasm with its accompanying malposition of the head Consequently for the past several months she has directed practically all her household duties from a couch getting up for only a few minutes at a time

Examination The patient was a vigorous woman who attempted to be cheerful in spite of her malady and in whom there were apparently no neurotic stigmata While lying in bed she seemed to be quite comfortable and the only symptoms noticeable were a slight tilting of the head to the right and a definite enlargement of the right sternomastoid On sitting up however a fine tremor of the head simulating the senile type immediately became noticeable then in a moment or two the head would be jerked spasmodically toward the right shoulder with the chin rotated to the left (Fig 1) So long as she was erect the muscles never relaxed and the head was persistently held by an increasingly painful spasm Though she could relieve the tension in some degree by supporting the head with her hand the pain became unendurable and she soon had to lie down to get relief

It was quite impossible to single out all the individual muscles affected the right sternomastoid stood out prominently and so far as one could judge all of the right posterior group were also in a state of contraction

A general physical and complete neurological examination was quite negative There was no nystagmus no visual disturbance the blood and urine were *negative*

There was no doubt about the severity of the malady and any surgical measure which might relieve her disability was worthy of consideration

Operation January 13 1923 (Dr Cushing) *Right combined cerebellar and upper cord exposure with intrameningeal division of the spinal accessory and posterior and anterior roots of the upper three cervical nerves on the right side*

The patient was placed in the usual cerebellar position and an incision marked out which would permit exposure of the upper cervical and right suboccipital regions The flap was reflected to the right care being taken to keep the vertical incision in the median line to minimize hæmorrhage The spines *and laminæ* of the upper three vertebræ were identified and removed without difficulty About as much of the occipital bone was removed as is shown in the operative sketch (Fig 3)

The dura was opened over the right cerebellar region and down the length of the laminectomy Through the intact transparent arachnoid it was possible to see the nerve roots and the spinal accessory The arachnoid was then opened and the fluid allowed to escape When that was done the spinal accessory was followed up to its point of exit at the jugular foramen and divided In turn the



Fig. (left) Patient during operation—before operation
Fig. Patient 8 months after operation. Photograph showing the occasional slight hypertonus

sensory and motor root of the first second and third nerves on the right side were hooked up and divided at their point of entrance into the dura. The dentate ligament was also divided and the cord rolled to the side to make sure that the division was complete. There was slight bleeding on dividing the second cervical which was the largest of these roots and it was necessary to implant a bit of muscle to control hæmorrhage. The wound was left dry and was closed in layers with fine silk sutures. The usual cerebellar emergency dressing was applied but with no attempt at fixation or other correction. The patient left the table in good condition.

Postoperative notes. Shortly after recovering from the anæsthetic the patient could talk only in a whisper. When examined the next day a weakness of the right palate and vocal cord was noted. It was thought that either the glossopharyngeal and vagus had been slightly injured or that some of the fibers of the spinal accessory were in this case motor to the palate and vocal cord. These disturbing symptoms disappeared within a few days.

At the end of 2 weeks she was allowed to sit up in bed and the marked improvement in her condition was for the first time apparent. The painful and spasmodic manipulations of the head had disappeared though the fine tremor persisted apparently unchanged.

At the end of 3 weeks she was up and about. A satisfactory convalescence continued and she was discharged 6 weeks after the operation with no return of the pain or spasm.

Subsequent note. A number of letters were received all of them indicating that she had experienced great relief. On September 2, 1923, 8 months after the operation, a report on her person. She looked well was most cheerful and expressed herself as gratified with the results of the operation. She had been completely free from the former spasms and able to be on her feet and to do her own housework as in former days. Though the head was held in good position (Fig. 2), free from its former twist the fine tremor nevertheless was still present. This she stated was aggravated by fatigue. Her voice had regained its normal timbre.

There was complete paralysis and atrophy of the right sternomastoid, weakness and atrophy of the upper trapezius with slight drooping of the shoulder. The right splenius however stood out with some prominence and appeared to be in mild spasm also the posterior muscles on the other side of the neck gave one the impression of being in slightly increased tonus. No doubt the deeper muscles on the right supplied by the first second and third nerves were paralyzed (though it was impossible to tell this by palpation) leaving the partly paralyzed splenius under control of the lower cervical nerves.

At the present time a year after the operation her condition remains the same and the procedure may be considered to have been successful beyond expectations. However knowing the tendency of this intractable malady to spread it is not impossible that we are dealing with an arrest rather than a cure.

In any discussion of torticollis it is necessary at the outset to get a clear idea of what is meant by the term. Here we shall not deal with the so called congenital torticolli seen in children and due (1) to some skeletal defect such as an extra wedge shaped vertebra and (2) to a definite shortening of the sternomastoid resulting from fibrous tissue

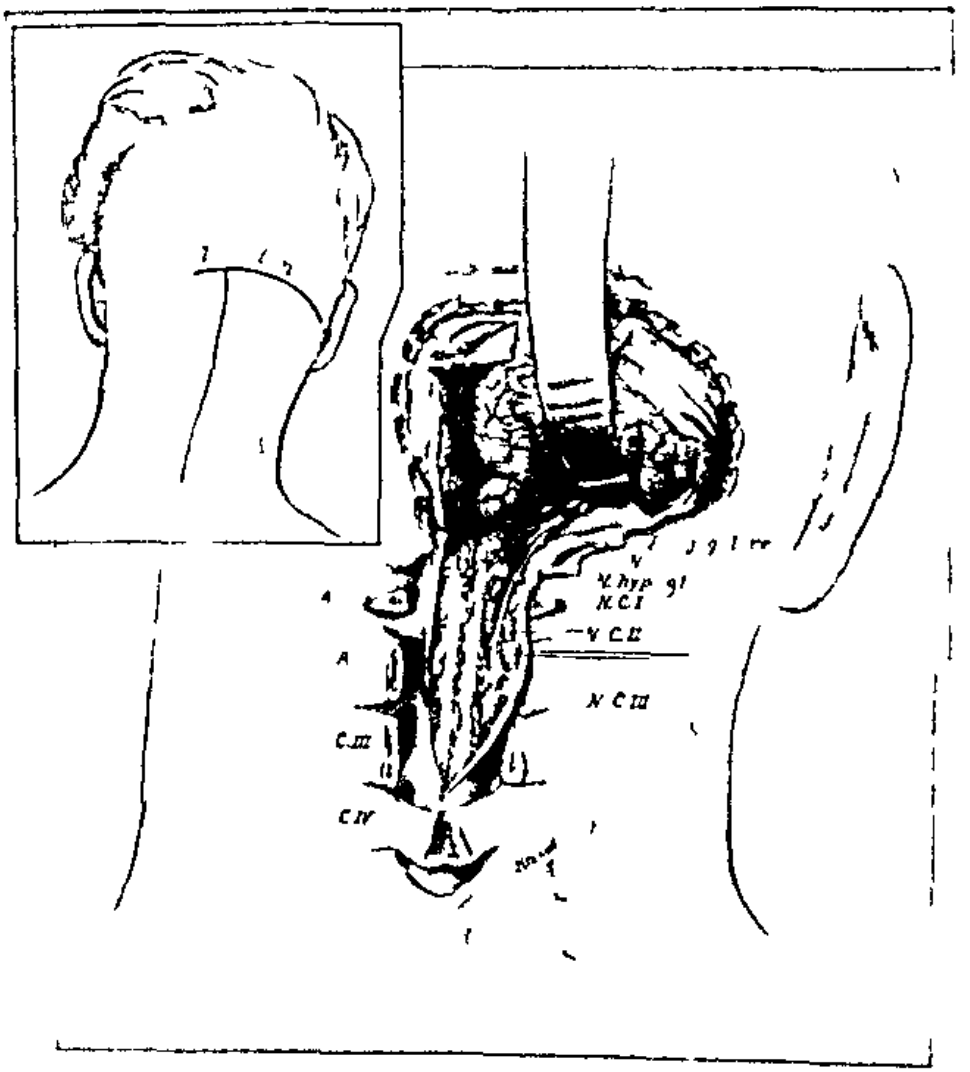


Fig. 3. Diagram showing origin of the nerve roots

formation caused in various ways by injury to the muscle.

Apart from the congenital group, René Cruchet (1) in his treatise published in 1907 distinguishes the following eight varieties which occur later on in life and in which no definite pathological changes have been found:

1. Neuralgic torticollis.
2. Rhythmic torticollis.
3. Paralytic torticollis.
4. Cervical torticollis.
5. Professional torticollis.
6. Frank spasmodic torticollis unaccompanied by pain.
7. Habit torticollis.
8. Mental torticollis.

As we interpret his definition of these varieties we would have difficulty in placing the case just reported in any of the groups but feel that the term painful spasmodic torticollis of unknown origin is most suitable.

SURGICAL TREATMENT

Before considering the operative procedures which have been hitherto practised it is well to refresh one's memory of the muscles concerned and also of their mechanical action.

The insertion of these muscles is shown in the accompanying sketch (Fig. 4) of the base of the skull. In addition the obliquus capitis inferior which is not shown arises from the axis and is inserted into the atlas and is a strong rotator of the head. These muscles may be divided into four groups, the two sternomastoids being the only muscles of size

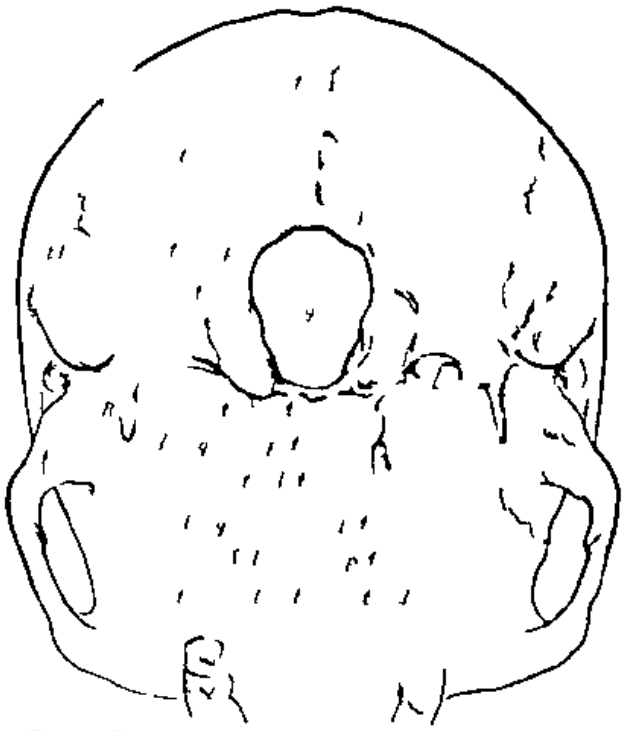


Fig. 4.—Diagram to show the place of attachment of the muscles to the base of the skull of the human subject.

with an anterior attachment while the remainder make up the posterior group.

As the mechanical action of these four groups is somewhat confusing the accompanying diagram (Fig. 5) may be helpful.

It can be seen at a glance that tilting and rotation of the head may be in various directions depending not only on the groups involved but also on their relative degree of spasm. For example, *A* and *D* together would tilt the head to the right but if *D* were exerting a greater pull than *A* the head would be not only tilted to the right but also rotated to the left as in the case reported. These groups may be involved singly or in any combination although Richard and Walton (2) state that in their experience it was more usual for the sternomastoid of one side and the posterior group on the opposite side to be involved. These two groups would act together in rotating the head but not in tilting it to one side.

Having pointed out the mechanical action and the possible combinations of group spasm which may occur it is clear that a very careful examination is necessary so that the group combination may be determined and in this way the surgical treatment properly directed. In the case reported it was necessary to plan an operation to relieve the spasm in two groups on the same side a combination which possibly is rather uncommon.

Because of the ease with which the sternomastoid may be seen and examined they are looked upon as the chief offenders more often than is warranted and surgical treatment has commonly been directed toward them alone. But it has gradually become recognized that more extensive procedures are often necessary. Indeed the disability may be so great that any operative procedure no matter how formidable is worthy of consideration if it offers any hope of relief.

The operations hitherto practised have been based on the following principles: (1) to paralyze a muscle or group of muscles by section of their motor nerve supply and (2) to destroy the function of the muscle by division of the muscle itself.

It is apparent that any type of operation based on these principles is limited obviously one must not destroy the function of all the muscles supporting the head. Also in the type of operation performed on the case here reported the procedure was necessarily restricted to the upper three roots for fear of injury to the phrenic nerve.

It occurred to the writer in considering these surgical measures and the intraspinal operation here reported to suggest another procedure one which might stop spasm without paralyzing or completely destroying the function of the muscles. Such a method theoretically at least seems possible when certain physiological principles are considered.

Sherrington (3) states: In decerebrate rigidity the tonic rigidity of a muscle is maintained when all the nerves to the limb have been severed excepting the nerves of the muscle itself. The rigidity of the muscle immediately ceases on severance of the spinal afferent roots through which pass the afferent fibers from the muscle.

Based on this principle considerable work has been done on section of the posterior roots for the relief of spasm in certain neurological conditions especially Little's disease. A number of cases have been collected (4 and

5) and certain of the results so far as the relief of spasm is concerned are quite striking

It remains then to suggest that the muscle spasm as seen in torticollis may be effectively relieved by section limited to the posterior roots But in considering such a type of operation it is to be noted that division lower down than the sixth would cause anæsthesia of the fingers It is obvious then that all of the afferent fibers from—say the splenius—could not be divided as they probably enter by all of the cervical and the upper two or three thoracic posterior roots

The question then arises would section of some or most of the afferent fibers from any muscle diminish its spasm? There does not appear to be any direct experimental evidence on this point In the experiments we have been able to look up all of the afferent fibers were divided and not part as would necessarily be the case with the splenius capitus In discussing this point with Professor Forbes of Harvard he stated It is my impression that the decerebrate rigidity of any given muscle would diminish in proportion to the number of afferent fibers divided If this be the case and it is a point which should be open to experimental proof the spasm of the splenius might be definitely lessened if not completely abolished by section of the upper five or six posterior roots What has been said with regard to the splenius is also applicable to the other long muscles concerned namely the semispinalis capitis and longissimus capitis

It would of course still be necessary to divide the spinal accessory as the afferent fibers from the sternomastoid travel in this nerve and do not enter the cord by the posterior roots

It is interesting to speculate regarding the active movements which would remain after a bilateral section of the upper six posterior root Sherrington (5) quotes the two following experiments

(1) The afferent roots of the fifth sixth seventh eighth right cervical and the right first thoracic nerves were severed Marked ataxia of the right forelimbs ensued with obvious weakness of the right forearm ( ) In a similar experiment the fifth root was not cut and the resultant ataxia and weakness was distinctly less than in experiment 1

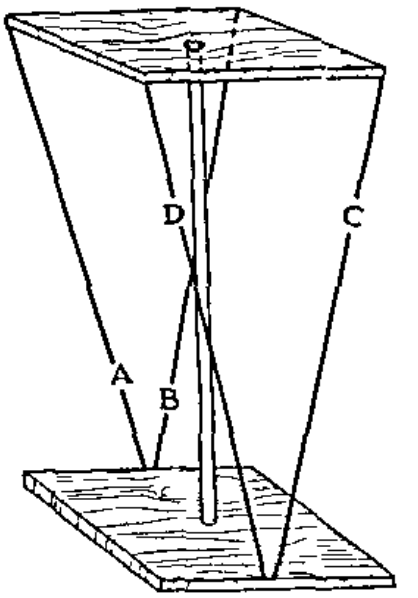


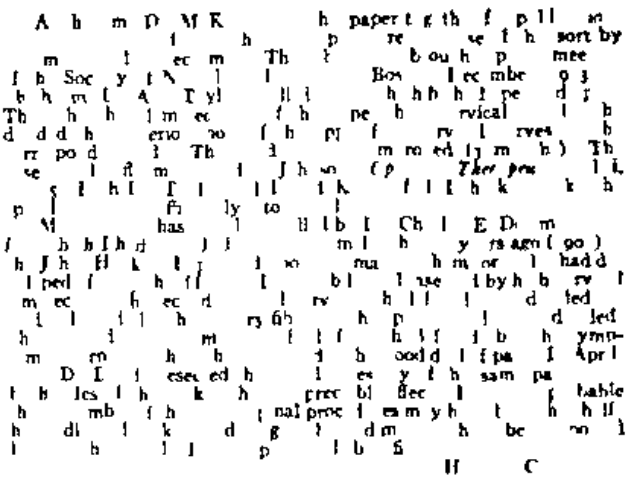
Fig 5 Diagrammatic illustrating the action of the following groups of muscles in tilting and rotating the head *D* and *C* represent the sternomastoid and *A* and *B* the two posterior groups

It may therefore be assumed that in a bilateral section of the upper six roots in the neck the movements would be weak *and* ataxic How this ataxia would affect the posterior muscle groups which support the head and which are possibly *controlled in* part at least by the impulses from the special senses as well as by common sensation is a question which cannot now be answered

SUMMARY

1 A case of spasmodic torticollis operated on by Dr Cushing is here reported Intramedullary *division of* the right spinal accessory together with the combined trunk for each of the three upper right cervical segments was performed Great improvement followed the operation

2 Intraspinal division of the posterior roots only of the upper cervical nerves leaving the anterior roots intact is suggested It is thought that by this means the spasm in the posterior muscles as seen in torticollis could be markedly diminished if it could not be entirely abolished and that the weak active function of these muscles would still be retained



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THYROCARDIACS THEIR DIAGNOSTIC DIFFICULTIES THEIR SURGICAL TREATMENT

A RELATIVELY NEW FIELD FOR SURGERY

BY FRANK H LAHEY M D F A C S AND BURTON F HAMILTON M D Boston

The New England Deaconess Hospital

DURING the past 10 to 15 years there have been extraordinary advances in diagnosis and surgical treatment of thyroid disease This has resulted in the organization in general surgical clinics of departments particularly equipped for the care and study of thyroid cases Thanks to such an organization at the New England Deaconess Hospital we have been able to establish a preliminary routine examination of such a character as to differentiate safely the confusing cases of fatigue or neurosis simulating hyperthyroidism but in reality not of thyroid origin from those of true thyroid origin In nearly all cases of hyperthyroidism we have been able to effect relief of clinical symptoms by operation and to confirm this by laboratory tests at repeated follow up visits and to keep the mortality of the total operative cases always below 1 per cent

As a part of the expansion of the systematic handling of thyroid cases the special study and treatment of cardiovascular problems ever present among the toxic cases has been taken up in the clinic during the past few years Before this surgery had been denied to a not inconsiderable number of cases for example some of the older cases with persistently irregular heart and with varying degrees of disability up to complete invalidism with persistent congestive heart failure (decompensation) were considered practically hopeless—too dangerous as operative risks and too far gone for hope of improvement even though they might survive operation

Many of these cases disabled by heart disorder were atypical in the signs of hyperthyroidism and superficially appeared to be disabled solely by heart disease The gradual development of greater clinical accuracy in diagnosis together with the development of more satisfactory methods in the preparation for operation selection of the type of operation the postoperative care and the many other details of proper surgical management of thyroid cases has resulted in the successful operative treatment of many such bothersome and untempting risks The results most fortunately have been better than could possibly have been anticipated

The effects of thyroid intoxication upon the heart differ greatly In young individuals with previously undamaged hearts there appears to be no cardiac changes no matter how intense the degree of thyroid toxicity In these cases hyperthyroidism can exist up to the point of complete disability and even death with no true signs of heart failure or variations from the normal in the heart findings except for rapid rate

On the other hand hyperthyroidism picks out many of the older patients particularly those with previously damaged hearts and produces profound cardiac effects

The first significant sign in these cases is the sudden onset of a completely disorderly heart beat auricular fibrillation The onset of such an attack may date from an exacerbation of the thyroidism from an intercurrent infection or from a mechanical strain A very common time for the first occurrence of auricular fibrillation is in association with an exacerbation of toxic symptoms during the 48 hours following operation So consistently does this occur in certain types of individuals that it is possible to prophesy preoperatively with reasonable accuracy in what cases auricular fibrillation may occur following operation upon the thyroid These first attacks are nearly always transient and patients who are cured of their hyperthyroidism at this stage of heart affection nearly always have no more attacks

We have learned however that hyperthyroidism if allowed to continue in patients who have been subject to transient attacks of auricular fibrillation tend to result in the establishment of permanent auricular fibrillation Some of our cases have had this persistent absolute disorder of the heart beat for months and even years before coming to us And in many such cases where the burden of hyperthyroidism on a heart thus embarrassed by auricular fibrillation continues the result may be heart failure perhaps in a transient attack but more surely in a slow progressive state of failure resulting at last in complete bedridden disability These thyrocardiacs with which this paper deals thus represent the end results of untreated hyperthyroidism in certain individual cases We wish to emphasize the fact that they are not simply severely toxic hyperthyroidism cases with auricular fibrillation and disability but have gone beyond this state and show the actual gross signs of true heart failure of the congestive type as described in the following paragraph

DIAGNOSIS

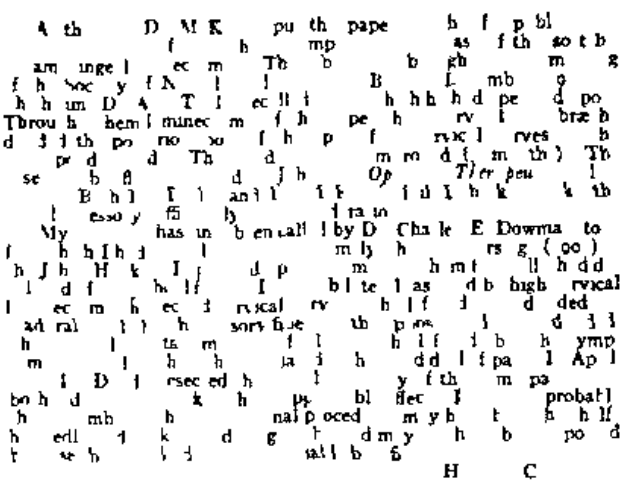
These cases as they have come to the clinic present the classical picture of the congestive type of heart failure They are sitting upright breathing rapidly and noisily with lungs full of rales sometimes expectorating blood tinged mucus the neck veins are full the liver is markedly engorged oftener than not they are dropsical to the waist and some have also œdema of the thoracic wall and upper extremities

The diagnosis of hyperthyroidism in this group of cases with congestive heart failure is by no means as simple as in thyroid cases uncomplicated by heart failure

If the very obvious features of hyperthyroidism such as goiter and exophthalmos together with a typical past history of hyperthyroidism are present in a patient with cardiac decompensation the diagnosis of a thyrocardiac state may not be difficult But such clear cut cases are rare in our series

The diagnosis of hyperthyroidism in general hinges largely upon a high basal metabolism rate and elevation of the metabolism rate has been persistently present in all of our thyrocardiacs but the nature of basal metabolism tests *demands that* where they are used as final evidence of underlying hyperthyroidism especially in these decompensated cases the readings should be *taken repeatedly* and that they be taken after acute decompensation is relieved as much as possible

For example an occasional cardiac case has suggested hyperthyroidism and given several successive high basal metabolism readings when further investigation has shown a drop to normal and no hyperthyroidism One patient continued to have high basal metabolism readings and decompensation (this case had a suggestively large thyroid and several secondary symptoms suggesting hyperthyroidism to confuse us) and proved on investigation to have an underlying chronic



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nephritis with kidney failure which caused the cardiac decompensation

Persistently and truly elevated basal metabolism rate is then essential to the positive diagnosis Again woeful error may follow an uncritical faith in high reading

Rapid heart rate is almost an essential accompaniment of high basal metabolism and therefore should be present with every positive diagnosis of hyperthyroidism But nearly every one of our cases had prolonged rest in bed before final diagnosis and this tends to slow heart rate appreciably even in definitely toxic cases Also all but one case had auricular fibrillation and even where hyperthyroidism and decompensation are present the heart rate may be lowered when auricular fibrillation is present and proper doses of digitalis are given These facts may result in a deceptively quieted pulse in very toxic individuals when the patient is seen only under rest conditions not even making the slight exertion necessary to being up and about a hospital room

Thyroid enlargement is seldom present to help the diagnosis The thyroid has been found in the group of cases either of the small multiple adenomatous type or the small primary hyperthyroidism type In several cases the thyroid has been found enlarged or has been very much smaller than normal This finding was very difficult for us at first to reconcile to our clinical ideas of hyperthyroidism and we hesitated a long time before we operated upon the first cases but in view of other findings particularly persistently elevated metabolism rate we operated upon a number of such cases with a resulting drop to normal of the basal metabolism and with a surprising and intensely gratifying relief of disability In but one of our cases was the thyroid large and that one was of the diffuse colloid type

The consistency of these small thyroids is firm and fibrous in character They are never of the soft full and vascular type so commonly seen in cases of primary hyperthyroidism of short standing and in comparatively young people

There are many secondary signs in which the typical thyrocardiacs have differed from cases not yet complicated by heart failure They are not activated as are the typical hyperthyroidism cases but as we see them they apparently have gone beyond the tormented excited phase of hyperthyroidism to physical and mental exhaustion This mental and physical hebetude is a common and impressive symptom not always present

Tremor is often conspicuously absent

Emaciation often under a cloak of œdema is the rule but is not present in every case

They usually show a uniform dark pigmentation of the skin

They give the impression of being years older than their actual age and do actually average older by about 15 years than the uncomplicated hyperthyroidism cases but the age limits of the group are wide

It is easily seen that no hard and fast rules for the infallible recognition and diagnosis of thyrocardiacs can be laid down Intimate experience with a large number of these cases and their diagnostic peculiarities makes it relatively easy to suspect and confirm the suspicion

Since these cases must be and our cases have been found by physicians who can only see such cases occasionally we have made an effort to formulate practical rules for suspecting a patient of a thyrocardiac state and our experience with this group of cases has led us to the following rules

1 Every cardiac case in decompensation (or not in decompensation for that matter) with a goiter of whatever size or shape and of however long standing without causing symptoms before the heart symptoms appeared should be suspected of hyperthyroidism

2 Every cardiac who has prominent or staring eyes should be suspected of hyperthyroidism

3 Every case showing transient attacks of an established auricular fibrillation where there is emaciation with pigmentation should particularly be suspected of hyperthyroidism

4 Every case with auricular fibrillation with or without decompensation in which there is a discrepancy between the patient's condition the history and the heart findings should be suspected of hyperthyroidism

For example we do not commonly find young or middle aged people with auricular

fibrillation or with this and a persistent or variable decompensation not associated directly and varying with physical exertion unless there are present diastolic murmurs or other findings satisfactory to a diagnosis of a rheumatic heart disease Most of the thyrocardiacs have no diastolic murmurs and no rheumatic history It should be stated however that a number of our thyrocardiacs have also had rheumatic heart disease with mitral stenosis and one had also aortic regurgitation to confuse the picture further

Be it remembered that all but one of our thyrocardiacs had auricular fibrillation when they entered the clinic

SURGICAL TREATMENTS

We have operated upon 38 such recognized and diagnosed cases of hyperthyroidism complicating heart failure to date

The method of preparation for operation in brief has been as follows

For those in extreme state when coming to us the emergency procedure has been

1 Large and repeated doses of morphine
2 Venesection
3 Oxygen administration

These and all others of the group have had

1 Complete rest for at least 3 weeks (several have required long preparation) the degree of rest required differs from ordinary bed care in a ward to isolation with special nursing and every secondary aid to complete quiet

They have had thorough digitalization carefully maintained

After this preparation when in conference with the cardiologist it is determined that the greatest degree of relief from decompensation has been accomplished the patient is operated upon The endeavor has been to apply the operation which will accomplish the most at a single time without undue risk to the patient by means of the divided stage procedure In some instances when a patient has made good recovery from the decompensation it has even been possible to do a complete subtotal thyroidectomy in one stage Fortunately subtotal thyroidectomy upon the only moderately vascular thyroids found in this group is as a rule much easier than in those more toxic cases occurring in younger patients who have no complicating cardiac disorder and decompensation

The operative procedure itself differs little in this group from that in the uncomplicated cases of hyperthyroidism except that additional care must be exercised to make sure that the operative procedure chosen is one that will not require a prolonged anaesthesia or produce an extreme degree of postoperative reaction

In the beginning several of these cases were operated upon under local anesthesia with the idea that the heart would not endure gas oxygen anæsthesia Of late however we have tended more to gas oxygen in these cardiac cases and cannot see but that it is endured quite as well as local anesthesia

We have been strikingly impressed with the ease with which most of these but partly compensated cardiac cases endure surgical procedure upon the thyroid Fortunately also there is no marked degree of postoperative reaction They have required no unusual postoperative care except digitalis for auricular fibrillation

RESULTS

Thirty eight of these cases coming to the clinic in differing stages of and all with gross evidence of cardiac decompensation have now been operated upon with one death a mortality rate in this group of 2 6 per cent of the cases operated on The single operative death (December 192) came suddenly and unexpectedly 12 hours after a second stage operation Death was not preceded by any aggravation of signs of toxicity or heart failure and we believe it was due to an embolus of cardiac origin No necropsy could be obtained

For 3 years we have rejected no case as inoperable at the clinic though several have had such extreme congestion when they first entered the hospital that venesection in addition to other emergency treatment was required to save life A few cases have come to the clinic in extreme heart failure and died without operation in a few hours or days in spite of emergency measures

Ten patients were operated upon in one stage 17 in two stages 7 in three stages and 4 in four stages

Fourteen were absolutely bedridden for periods of weeks or months and in a few cases years before treatment Twenty-one were unable to work and were in bed part of the time and 3 (2 of these were among the very worst cases with gross heart failure) were still making an attempt to work until a few days before they came to us

Six have been operated upon recently are up and about but have not yet been allowed by us to go to work Twenty seven are able to work steadily at the present time one works part of the time (she has a rheumatic heart disease and had been bedridden 2 years before operation) and another one a particularly uncontrollable woman of 50 years who had been in many hospitals always leaving against advice we succeeded in preparing for operation in June 1923 So far as can be told she had been in continuous heart failure for a year before this She made the usual excellent recovery lost her signs of failure completely but against advice began at once to lead a very strenuous life She did housework—had insufficient hours for sleep— and was continuously active until she failed again 3 months later A stay of a few days in the hospital relieved her failure and she left against advice resumed her activity until after failure set in She arrived at another hospital just in time to die a few days ago (January 1924) Two who left the hospital in good condition we have not been able to trace

CONCLUSIONS

The effect of prolonged thyroid intoxication upon certain individuals is to produce auricular fibrillation and eventually true heart failure In these cases even partial restoration of compensation may quite safely be followed by thyroid surgery in properly selected stages

Subtotal thyroidectomy in such thyrocardiac cases relieves the failing heart of the burden that is making it fail and results in nearly all cases in complete relief of a complete disability *There is no comparable condition where persistent heart failure is consistently and safely cured by surgical measures*

This group of thyrocardiacs represents in a sense a new field for surgery small but intensely fertile It should stimulate everyone who has to deal with patients suffering with disability associated with heart failure to consider carefully that an underlying hyperthyroidism is not overlooked

The histories of our cases show the ease with which the ablest clinicians have been repeatedly deceived by these individual diagnostic problems and have missed the crucial diagnosis of underlying hyperthyroidism The certain inference is that there are scattered in the community occasional cases undiagnosed thyrocardiacs now disabled and discouragingly resistent to medical treatment directed at the heart but potentially curable

INTERSIGMOID HERNIA

With Report of a Case Involving Portions of Large and Small Intestine

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Professor of Clinical Surgery University of Toronto
AND
JAMES W ROSS M D Toronto Canada

In reviewing the literature we have found nine other cases of intersigmoid hernia which is the rarest type of internal hernia None of these cases shows a lesion of such extent as the one here reported and on this account the present case is of more than ordinary interest

The intersigmoid fossa or sigmoid notch is situated at the root of the mesosigmoid Moynihan credits its formation to a failure in fusion of the left leaf of the mesosigmoid with the parietal peritoneum below the kidney This is Toldt's belief and one which is considered to explain best the formation of this opening

The fossa is a cone shaped funnel with apex upward and to the right and with orifice facing caudal and to the left It lies directly over the pelvic brim and its posterior relationship brings it over the left ureter The fossa is fairly constant and usually of a size to admit the ring finger as far as the second joint Treves found a distinct fossa in 52 per cent and a funnel haped depression in 13 per cent of cases Waldeyer found it in 84 per cent One of us in 46 cases examined found the fossa in 80 per cent It was of moderate size in 61 per cent In these cases the length of the sigmoid varied from 22 centimeters to 62 centimeters and that of the mesosigmoid from 2 centimeters to 16 centimeters Considering the variable length of sigmoid and mesosigmoid the rarity of hernia through this fossa is surprising and must be due to the guarded position of the orifice

In his monograph Moynihan concedes as authentic cases of intersigmoid hernia namely those of Eve and Eccles That of the latter has been questioned by later writers who consider it an inguinal hernia reduced *en masse* The report of Lambret's case was inaccessible to Moynihan and was omitted from his summary However Coley includes this case as authentic but questions Eccles case Moynihan accepts the latter and both are included in this paper

In 1916 Rendle Short added to Moynihan's list the case reported by Coley about which there can be no doubt Krall had reported an instance in 1911 somewhat similar to that here presented in that a portion of the *sigmoid* itself was looped over and caught in the fossa In the same year a case was reported by Machol Another one published by Nuzum and Nuzum we believe is authentic as also that reported by Taylor in 1918 We cannot however accept Black's case There is also a case described by Murphy which must be included

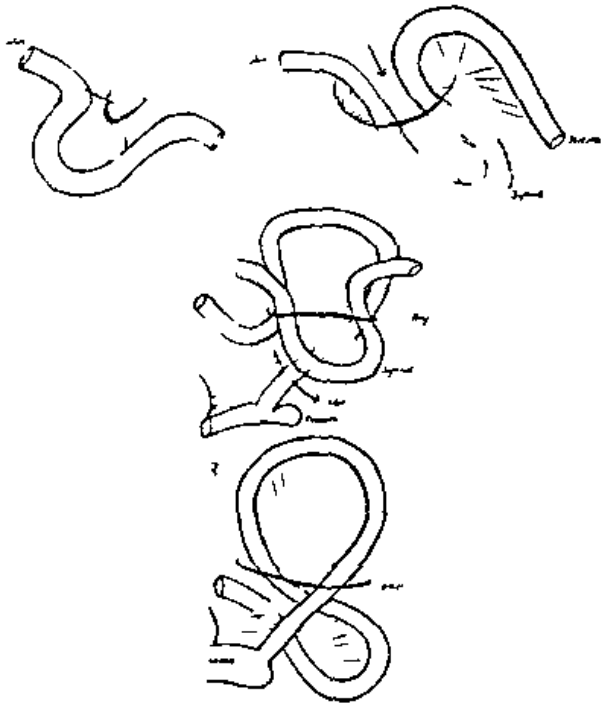
A short description of the salient features in the reports mentioned will establish the identity of the lesions described

1 In Eccles case a four inch loop of small intestine had become strangulated passing under the margin of the intersigmoid fossa The edge was divided and resection done but death followed

2 In Eve's case the sigmoid was drawn up by a band uniting it to the cæcum and the fossa thus was exposed A left inguinal hernia had recently been reduced *en masse* and Coley believes that the obstruction may have been the sequel to this Eccles definitely states The constricting edge afterward proved to be the margin of the aperture of intersigmoid fossa

3 Lambret reports subacute obstruction for 3 days following straining at stool At operation a loop of bowel was pulled out of the intersigmoid fossa leaving a cavity the size of a mandarin containing bloody exudate The patient died after a further enterostomy

4 The hernia reported by Coley was in a newborn male infant The sac was very large and lay to outer side of the sigmoid flexure the opening looking downward and to the right



4

F t 4 Sch m t l g ll tr t g the d l p m t f th t gm d h m

5 Krall s case involving a portion of the igmoid ha already been alluded to In this instance which was successfully operated on by Wilms the upper rectum was t vi ted on its axis through 180 degrees and the lower sigmoid drawn up into the fossa

6 Machol describes acute intestinal ob struction in a male of 66 wherein 30 centi meters of mall bowel beginning 50 centi meters above the cæcum was found in the upper and largest of three recesses opening through the intersigmoid notch

7 Nuzum and Nuzum give Le Count s description of the condition found at autopsy There were no symptoms referable to the her nia The illu tration i de riptive The fossa wa 8 centimeters in diameter and the edge showed no thickening or enlarged blood ves sels and wa covered by a gli tening serous membrane The entire small bowel is in thi sac

8 Taylor report a small knuckle of bowel ensnared by the fos a The edge was nicked and the bowel freed recovery followed

9 In the in tance cited by Murphy it wa discovered that a coil of the intestine had passed into a subperitoneal pocket at the root of the sigmoid and had become twisted on itself inside the pocket to the extent of pro ducing strangulation The patient recov ered

We therefore consider the case here recorded as the tenth of this rare condition

The patient as a well developed well nourished male 55 years of age In September 1921 a diag nosis of duodenal ulcer had been made by Dr Cot ton and it was noted at that time that the sigmoid was mobile and reduplicated In October Dr Cotton emoved the appendix on account of recurring ab dominal pai and could find no ulcer but the fol lowing February the patient vomited half a p nt of blood sho ing that the su pected ulcer was still active During the summer he gained in weight and had no further pa n

On Octob r 12 1922 his bowels moved normally and the pat ent was apparently in good health At 5 45 a m October 13 he was suddenly seized with pain n the lower abdomen and vomited Dr Cotton who as called washed out the stomach and had an enema given which vas effectual An ounce of castor o l was then prescribed At 9 15 the pain became more severe although the abdomen remained soft The ten perature was then 96 and the leucocyte cou t 24 000 At 10 30 a m he was in a state of shock The extremities v ere cold the pul e was rapid the face drawn and the abdomen somewh t rigid In view of the forme finding the most p ol ble dia nos was that of perforated duodenal ulcer but he wa in no condition for explorat on at th s tim Accord gly five hundred cub c centi meters of 5 per cent glucose was gi en ntra enously d heat and stimulants admin stered

At the patient s request following sl ght improve ment in his condition it was decided to explore at 4 p m after another five hundred cubic centimeters f gluco e had been given

On openi g the abdomen a larg quant ty (prob ably p ts) of blood stained fluid escaped and one could se strangulated bowel se eral feet in length having a dull and purplish black appearance The patient was mo bund so no attempt was m de to determ ne th extent of the lesion or its ex ct cause

Autopsy The peritoneal cavity contained about 2 qu rts of bloody flu d A strangulated coil of small b vel about 60 i ches in length presented Th was e n to emerge on the left and caudal side f om a const ct g band at the ro t of the sigmo d mese te y On tracing th s gm d upward from the re tum t was found th t the upper or proximal 10 inch s of the sigmoid it elf went thro gh this sam hole in a d ect on opposite to that bove lesc r bed forming a strangulated lo p of sigmoid on the right or cephal c side There was al o on th de an ight inch loop f il um dist lly co tinuo with the loop on th left side and prox mally c nt n ous v th the jejunum This last named loop

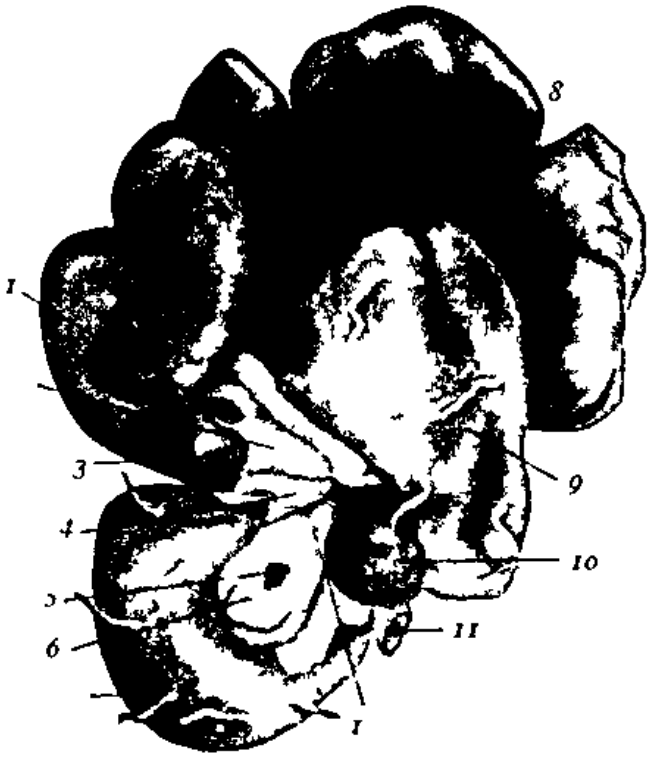


Fig. 5a. Drawing of specimen removed *en masse*. 1 Cut end of descending colon. 2 cut sigmoid mesentery. 3 cut end of jejunum. 4 cut mesentery of jejunum. 5 cut end of ascending colon. 6 cæcum. 7 upper sigmoid. 8 ileum. 60-inch loop. 9 terminal ileum. 10 jejunum. 11 cut end of rectum. 12 terminal ileum.

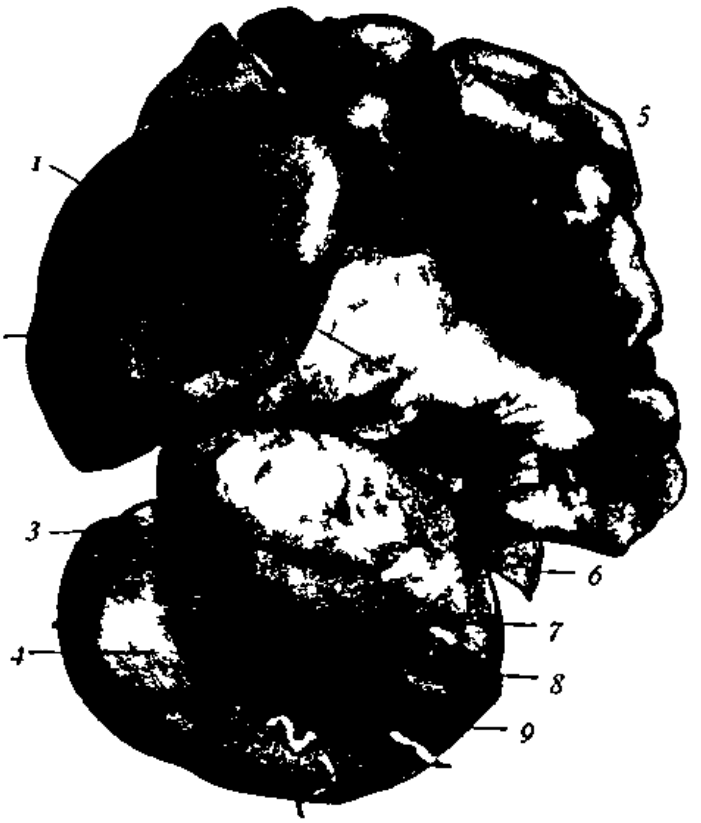


Fig. 5b. Drawing of specimen removed *en masse* (another view of specimen shown in Fig. 5a). 1 Mesentery of ileum. 2 intersigmoid fossa. 3 cut end of ascending colon. 4 cæcum. 5 ileum. 60-inch loop. 6 cut end of rectum. 7 terminal sigmoid. 8 jejunum. 8 inch loop. 9 upper sigmoid.

was constricted by passing under the terminal ileum and mesentery and not by the edge of the sigmoid fossa. The distal end of the sixty inch loop on the left was constricted by the margin of the sigmoid fossa at a point one and a half inches from the ileo cæcal valve.

There was no membrane noted. This may or may not have been present. In the event of the former it had been destroyed either at operation or autopsy for it was extremely difficult to trace the continuity of the various loops and their relation ship to one another even with considerable rough handling. If no membranes were present the funnel shaped fossa had been converted into a ring either by the hernia at the time of its occurrence or some time previously by rupture of the cephalad right leaf of the sigmoid mesentery.

It is of interest to note that there was a chronic perforating duodenal ulcer one third of an inch in diameter adherent to the head of the pancreas. It was found only on opening the duodenum and could not be felt through the wall of the gut.

The specimen (Fig. 5) was removed *en masse* by stripping the peritoneum and fascia from the pelvis psoas muscles and spine. Diagrams will serve to explain the condition and our view regarding its production. We have stated that no membrane was noted. The cephalic and caudal leaves of the sigmoid mesentery were continuous with one another through the fibrous ring. There was no torn peritoneal edge. We therefore consider it likely that the ring existed as such for a considerable time possibly as a developmental anomaly.

We believe that the sigmoid probably initiated the train of events by forcing its way through its fibrous ring at the root of its own mesentery (Figs. 1 and). The ileum then excited to violent peristalsis forced a loop beneath the distended sigmoid and through the ring in the opposite direction (Fig. 3). This continued until the terminal ileum was stretched taut by its fixation at the cæcum and the ileum and its mesentery formed a band stretching across the pelvic brim. Beneath this the eight inch loop of jejunum was

caught (Fig. 4). From the extent of the lesion one can readily understand the profound shock so rapidly occasioned by it.

LITERATURE

B k J C I t gm d r t per t ne l h nia
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6 L SBERET H rn fo t r gm de E l méd
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7 MACHOL Be trag z K t s der Hern a t ters
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8 MOYNIHA B G A R trope t eal H rn B l
l e Tyndall d C 9 6
9 MURPHY JOHN B Il u an t es vmpt m man
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THE TREATMENT OF MALIGNANT DISEASES WITH RADIUM AND X-RAY—CANCER OF THE CERVIX[1]

BY ROBERT B. GREENOUGH, M.D., F.A.C.S., BOSTON, CHAIRMAN

Report of the Committee on Treatment of Malignant Diseases with Radium and X-Ray, appointed by the American College of Surgeons

THE result of treatment of cancer of the cervix of the uterus was selected as the first subject for investigation. Abstract cards were prepared by the committee and the co-operation of the established clinics in the various cities represented was sought and obtained. To the many individuals who have taken part in the investigation and especially to those junior men who took on the laborious task of transferring the clinic records to the abstract card the thanks of the committee are due. Without their interest and co-operation the investigation would have been impossible.

The cases selected for study were all treated in the years 1914 to 1919 inclusive. Each clinic was requested to provide a record of the cases of cancer of the cervix which entered the hospital within that period whether treated by operation, by radium or by any other method.[2]

It may be said that the results here recorded represent a considerable number of the clinics which are believed to be well equipped in every way to deal with this disease either by radiotherapy or by radical operative measures.

The problem before the committee was to collect data in regard to cases of cancer of the cervix treated by operation, by radium or X-ray or by any other method, or com

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bination of methods In order to make possible a fair comparison of the results of treatment it was necessary that the same rigid conditions should obtain in determining the results of all methods of treatment as have been agreed upon by the surgical world to be necessary in reporting the end results of the operative treatment of cancer in its various situations It was also necessary especially when dealing with the cases treated by radiation to obtain a classification of cases according to the extent of disease present at admission to the hospital so that early favorable cases treated by operation should not be compared directly with advanced cases subjected to radiation only as a palliative measure Such a classification of cases based upon the clinical findings on admission and corrected when possible by subsequent operative findings has been procured

The correction of the clinical classification of cases by subsequent operative findings undoubtedly leads to a more correct estimate of the actual conditions but it should be recognized that cases which are not subjected to operation are not reclassified and this fact therefore works somewhat to the disadvantage of the cases treated by radium or other non operative procedures

Before presenting the statistical result of the investigation a few comments upon the conditions seem to the committee to be appropriate In order to obtain a sufficient number of case records and in order to have a sufficiently long period after operative treatment to estimate the end results on the arbitrary 3 year basis it was necessary to set the period of investigation for the calendar years 1914–15–16–17 and 18 In 1923 this was extended to include the year 1919

During this period which includes the years of the war hospital services were somewhat disorganized clinical work on these problems was interrupted and hospital record were not always kept as fully up to date as could be desired The radical operative treatment of cancer of the cervix had been fairly well standardized and was in general use in operative clinics Radium therapy during these years however was in a state of constant experimental modification The dosage employed was as a rule less than in these same clinics at the present time 1924 and the application of radium was less accurately accomplished Repeated treatments were employed in many cases in contrast to the single massive dose administered under anesthesia and with all the conditions of a surgical operation such as is the usual technique at the present time It may be said that it is the general opinion of radiotherapists that the results of radium therapy during the period under discussion were far less favorable than are those to be anticipated from the technique now employed Since the results of the present method however cannot be judged for at least 3 years to come it is believed wise to consider what was then accomplished and to await the end results of the present methods as they mature We must admit however that as between radium and radical operation these conditions are to the disadvantage of radium in no small degree

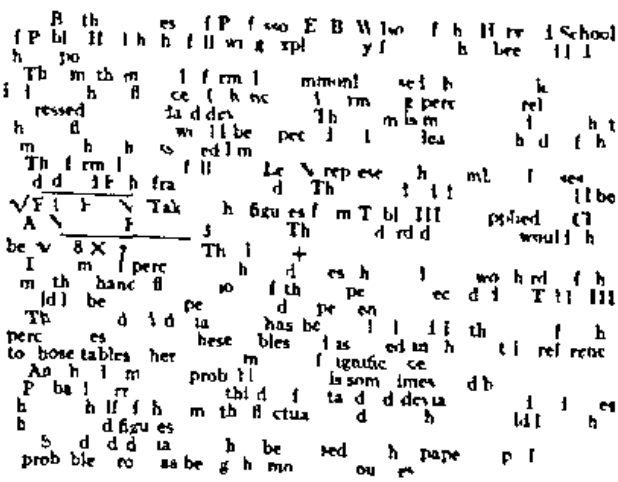
During the period concerned in this investigation high voltage short wave length X ray therapy was not in common use and no cases were recorded in which X ray was employed except as an adjunct to other methods To judge of the value of X ray from these data is therefore quite impossible

The standard surgical report of end results in cancer cases furthermore demands pathological evidence of the presence of cancer In operative cases this is readily obtained as the tissue removed is submitted entire to the pathologist In many cases suitable for radiotherapy however the removal of tissue for a biopsy cannot be accomplished without adding to the discomfort of the patient or prolonging the operation and for these reasons is occasionally omitted by the surgeon who feels himself quite competent to make a diagnosis on clinical evidence alone Such cases while in all probability actual cases of cancer are of no value in this investigation as they fail to fulfill the prescribed conditions and thus must be omitted as inconclusive There were 3 such cases in this series 8 in which hysterectomy was followed by radium and 22 in which radium alone or combined with cauterization was employed All of these cases are alive and well and their omission on

account of lack of pathological evidence of cancer lowers the percentage of cures by radium in comparison with hysterectomy We believe that due weight should be given to the facts in estimating the value of the different methods of treatment

Attention should be called to the use of the words cure in the following pages The term is used in the most convenient one to express the fact that the case in question is reported free from evidence of disease at a period years or more subsequent to treatment It is not meant to imply that subsequent recurrence of the disease may not take place It is the purpose of the Committee to obtain later reports on all these cases

While the total number of case records already large constant addition to this number are to be expected and supplementary reports will be prepared from time to time and presented by the committee When the total number of cases is divided into the different classes however and when these numbers are again subdivided into smaller groups according to the method of treatment employed the numbers of cases in each group are much diminished to such an extent indeed in certain groups as to make possible serious error if too much weight is placed upon variation of slight degrees in the percentages obtained The committee does not wish to be accused of failing to recognize these facts but draws attention to them that no misunderstanding of the conditions may occur Such as they are however and pending the receipt of additional records which may tend to overcome the objection by providing larger numbers of cases in each group the results are here reported



TABULATION OF RESULTS

It was necessary to reject 381 records of the total number of 1 10 The reasons for discarding these records are stated in the Table I

Thirty two cases were rejected as they lacked pathological evidence of the presence of cancer these cases were however all alive and well more than 3 years after treatment

Twenty five cases were rejected because less than 3 years had elapsed from the time of the last treatment these cases also were alive and well

Five cases however were accepted as three year cures in which a period of 3 years had not elapsed after the last treatment with radium These were all cases in which the original treatment was given more than 3 years before and the later radium treatment was given without evidence of recurrence only as a prophylactic measure One of these was a case of hysterectomy with postoperative prophylactic radiation one cautery and radium and three were treated by radium alone

Eight hundred and twenty nine cases remain satisfactory for study

TABLE I —REASONS FOR REJECTING 381 RECORDS

Total number of records	1
Duplicates	
Lantern cases	150
Not primary cervical	
No time limit	50
No pathological proof	32
Died of cancer	25
Hysterectomy—duplicates	5
1923 1930–1931	41
Not definitely stated	3
Otherwise rejected	2
	381
Satisfactory for study	829

In Table II we have divided the 688 primary cases into the four groups

1 A—Early favorable
1 B—Border line
1 C—Broad ligaments involved
1 D—Advanced cases

There were 123 cases of recurrence after hysterectomy the hysterectomy in these cases having been done in some other institution None of these cases appears in the 688 primary cases above recorded

There were 18 cases in which cancer of the cervix developed in the stump left after a supravaginal hysterectomy for fibroid

TABLE II —DIVISION OF PRIMARY CASES

Primary cases	
A—Early favorable	23
B—Borderline	10
C—Badly diseased in bad condition	30
D—Advanced cases	35
	688
Recurrent after hysterectomy	23
Cancer of cervical stump	8
Total	829

Table III records the results of treatment in the different classes of cases As would be expected the greatest number as well as the greatest percentage of cures occur in the early and favorable cases

There were 9 cures of recurrence after hysterectomy and there were 2 cures in cancer of the cervical stump Ninety four cases of the whole number or 11 per cent were cured of their disease It should be repeated that in all of these tables the word cure is used advisedly to indicate only a period of 3 or more years elasped without evidence of disease It is the intention of the committee to obtain later reports on all these cases

TABLE III —RESULTS OF TREATMENT IN DIFFERENT CLASSES OF CASES

Primary cases	Cases	Cures	Per cent
Class 1—A	3	35	8
Class 2—B	0		8
Class 3—C	310	4	7
Class 4—D	35		
	688	83	9
Classes 2 and 3—Recurrent after hysterectomy	13	9	7
Class 4—Cervical stump	8		
Total	89	94	11

All of the cases of this series entered the hospital in the calendar years 1914–1919 inclusive

Table IV indicates the number of years that have elapsed in the cured primary cases It is to be noted that cures of 6 or 7 years duration have been obtained by hysterectomy with or without radium and by radium or radium with palliative operation

TABLE IV —NUMBER OF YEARS ELAPSED IN CURED PRIMARY CASES

Cases	Duration 3–4 Yrs	4–5 Yrs	5–6 Yrs	6–7 Yrs	7–8 Yrs	Total
Hysterectomy alone	5	5	6	3		19
Hysterectomy and radium				4	2	8
Radium alone		3	1	1	3	9
Radium and X ray	2	5	1	2	4	24
Radium and cautery				1		4
Radium and amputation	2	6	5		3	6
Cautery and ligation		1				1
Total	23	23	14	11	12	83

Table V indicates the actual numbers of cases and the percentage of the total number which were cured by different methods of treatment It will be seen that radium alone or with X ray was responsible for 37 cures or 44 per cent of the total number and radium and X ray with or without a palliative operation gave 56 cures or 66 per cent of the total cases treated This is to be taken merely as an indication of the absolute value of radium in the treatment of this series of cases of cancer of the cervix It is not in any way an indication of the relative value of radium as compared to hysterectomy

TABLE V —ACTUAL NUMBER OF CASES AND PERCENTAGE OF TOTAL NUMBER CURED BY DIFFERENT METHODS OF TREATMENT

89 Cases—94 Cures

	Cases	Per cent
By hysterectomy alone	19	22
By hysterectomy supplemented by radium	8	9
By radium alone with X ray	37	44
By radium and palliative operation	9	
By cautery alone	0	
By cautery and ligation	1	01
Total	94	

Table VI shows the results of different methods of treatment in 688 primary cases regardless of the extent of their disease It is to be noted that the percentage of cures by hysterectomy alone (26 per cent) is the same as the cures in cases where pre

[illegible] primitive radium is em[illegible] mortality of 16 per [illegible] in [illegible] rectomy is also to be [illegible]

[illegible] hysterectomies performed in [illegible] primary [illegible] One hundred and [illegible] were primary hysterectomies after [illegible] Wertheim technique Nine were recorded [illegible] abdominal hysterectomies In 6 [illegible] supravaginal hysterectomy was [illegible] and in 4 cases vaginal hysterectomy was performed It is a notable fact that [illegible] 4 vaginal hysterectomies resulted in [illegible]

Fifty two cases were treated by cautery alone and in 9 cases cautery was used in combination with radium or X ray In many of the hysterectomies also cautery was used as a preliminary measure either prior to or as a first step in the radical operation In 24 of the cautery operations the record stated that the Percy technique was followed Five of these cases appear in the list of cures but in 4 of them the cauterization was supplemented by radium treatment and in the other one a hysterectomy was done No one of the 52 cases in which cautery alone was used resulted in cure

TABLE VI —RESULTS OF TREATMENT REGARDLESS OF EXTENT OF DISEASE

	Cases	C	P
Hysterectomy [illegible]	4	9	6
Hysterectomy with [illegible]m	7	8	6
Hysterectomy with X ray		0	
46 hysterectomies			
3 [illegible]at[illegible]l[illegible]u			6
Hysterectomy [illegible] preoperative			
radium	4		25
Hysterectomy with postoperative			
radium	3	8	27
Hysterectomy with [illegible] radium	4[illegible]	37	2
4 hysterectomies [illegible] preoperative			
radium			
4 operative [illegible]t[illegible]			1

Table VII gives some further details of the results of treatment It is to be noted that the preoperative use of radium in 40 cases followed by hysterectomy gave approximately the same percentage of cures (25 per cent) as when radium was used in postoperative treatment (27 per cent) It is to be noted also that the 40 cases of preoperative radiation did not appear to increase the hazard of operation to any great extent as it was found that only 4 (10 per cent) of these cases died of operation

TABLE VII —FURTHER DETAILS OF TREATMENT

	Cases	C	P	[illegible]
Radium alone	363	24	6	
Radium and X ray		4		
Radium and cautery	9	16	17	
Radium without X ray				
palliative operation	478	45	9	
Cautery	5			
Other method	12	1	8	
4 [illegible] radium application				
1 peritoneal fatality				2

The main purpose of this investigation may be said to have been to obtain a classification of cases with reference to the extent of the disease in order that a fair comparison should be possible of the results of different methods of treatment in similar cases

Table VIII indicates the results of treatment in the I A group of early favorable (operable) cases

Hysterectomy without radium gave 14 cures in 41 cases (34 per cent) There were 8 operative fatalities a mortality of 19 per cent and the use of radium either before or after operation did not appear to increase the percentage of cures

Radium alone gave 15 per cent and radium combined with X ray cautery or other minor operative procedure gave 6 cures or 4 per cent

The numbers however are small and it is probable that we get a more accurate idea of the prospect of cure if we combine the cases treated with radium either with or without the use of the cautery getting 11 cures in 44 cases or 25 per cent Roughly stated in early favorable cases hysterectomy gives a chance in 3 of cure with an operative mortality of 1 in 5 where radium with or without the cautery gives a chance of cure of 1 in 4 without mortality

If to these percentages we apply the statisticians correction for standard deviation we find that the 34 per cent cures by hysterectomy should be recorded as 27 4 and the 25 per cent for radium (with or with

out cautery or \ ray) should be * 6 5 Thus chance alone might bring about a variation for the hy terectomy percentage from 26 6 per cent to 41 4 per cent and for the radium cases from 18 5 per cent to 31 3 per cent It is readily seen that these bound actually over lap and the difference in percentage is not of serious statistical significance

TABLE VIII —RESULTS OF TRFATMFNT IN GROUP I A

I A—123 Cases	Cases	Cures	P
Hysterectomy without radium	41	14	34
8 operative fatalities			19
Hysterectomy with radium	28	9	32
Pre-operative radium	13	4	30
3 operative fatalities			23
Post operative radium	15	5	33
\ fatalities			
Hysterectomy with or without radium	69	23	33
Radium alone	30	5	16
Radium and palliative operation and \ ray	14	6	42
Radium with or without palliative operation and \ ray	44	11	25

The I B group represents the so-called border line cases those in which the disease has begun to involve the vaginal wall or the cavity of the uterus but without extension into the broad ligaments (Table IX)

Hysterectomy alone gave 25 per cent cures in 16 cases The operative mortality ran as high as 31 per cent Hysterectomy with radium gave 33 per cent cures in 15 cases The cases in which radium was used before operation while only 6 in number gave 3 cures or 50 per cent

Radium alone gave only 10 per cent of cures Radium with palliative operation gave a showing equal to that of the hysterectomies with or without radium and radium with or without a palliative operation gave 13 cures or 16 per cent

It would appear that in the border line cases the prospect of cure by hysterectomy is less the use of radium before operation may possibly improve the outlook and the operative mortality is higher than in the I A group

Although the numbers are small it would suggest that the use of radium supplemented by a palliative operation gave the greatest prospect of cure and without operative risk The calculation of the standard deviation however indicates that the difference of percentage is not of great significance viz hysterectomy *with or without radium* 29 per cent * 8 radium with palliative operation 33 per cent * 3

TABLE IX —RESULTS OF TREATMENT IN GROUP I B

I B—120 Cases	Cases	Cures	P
Hysterectomy without radium	16	4	25
6 operative fatalities			37
Hysterectomy with radium	15	5	33
Pre-operative radium	6	3	50
1 operative fatality			16
Postoperative radium	9	2	22
No fatalities			
Hysterectomy with or without radium	31	9	29
Radium alone	56	6	10
Radium with palliative operation	21	7	33
Radium with or without palliative operation	77	3	16

Table X combines the groups I A and I B giving larger numbers to deal with Roughly stated hysterectomy without radium cures 1 in 3 with an operative fatality of 1 in 4

Radium with a palliative operation cured about 1 in 3 and radium with or without palliative operation about 1 in 5

If we calculate the standard deviation in these percentages we get

Hysterectomy with or without radium	32 per cent *4 6
Radium with or without palliative operation	19 per cent *3 5

TABLE X —RESULTS OF TREATMENT IN GROUPS I A AND I B COMBINED

I A and I B (combined)	Cases	Cures	P
Hysterectomy without radium	57	8	31
14 operative fatalities			21
Hysterectomy with radium	43	14	32
Pre-operative radium	19	7	36
4 operative fatalities			21
Postoperative radium	24	7	29
\ fatalities			
Hysterectomy with or without radium	100	32	32
Radium alone	86	1	12
Radium with palliative operation or \ ray	35	13	37
Radium with or without palliative operation	121	24	19

Table XI gives the results of treatment in the I C group where the disease was believed to have infiltrated the broad ligaments

There was 1 cure (7 per cent) and 2 operative fatalities in 13 cases treated by

hysterectomy alone The addition of pre operative or post operative radiation increased somewhat the percentage of cures (16 per cent) the numbers however were rather small

Radium alone cured 12 cases and radium with palliative operation 4 cases the numbers treated however were large and the percentage small

TABLE XI —RESULTS OF TREATMENT IN GROUP I C

	Cases	Cures	Per cent
Hysterectomy without radium	3		7
Hysterectomy with radium	5	4	6
Palliative operation	9	3	16
Not treated			
Postoperative radium	6		6
Not treated			
Hysterectomy without radium	37	5	3
Radium	89		6
Fatalities			5
Radium palliative			
X ray		7	3
Radium with palliative operation	24	9	7

Table XII shows the advanced and supposedly hopeless cases Six cases were operated upon with or without radium without success Only 2 cases appear in the three year cures 1 treated by radium alone and 1 by radium and cauterization It is obvious that these two cases at least were erroneously classed as hopeless This is in all probability due to the difficulty in distinguishing fixation of the uterus due to cancerous infiltration of the broad ligaments from a similar infiltration of an inflammatory character

TABLE XII —RESULTS OF TREATMENT IN GROUP I D

I D—135 C	Cases	Cures	Per cent
Hysterectomy without radium	4	0	0
Hysterectomy with radium		0	
Hysterectomy with radium	6	0	0
Radium	88		
Radium with palliative operation	27		3
Radium with palliative operation	5		7

Table XIII shows the duration of life in the cases not cured It will be seen that no material difference exists as between the different method of treatment

In the early favorable group radium alone gave a slightly longer average of life but in the less favorable cases this is not so apparent

Four cases in the 1 B group treated by hysterectomy averaged 7 months These numbers however are so small that little reliance should be placed upon this isolated observation

TABLE XIII —DURATION OF LIFE IN CASES NOT CURED

	Cases	Months
Hysterectomy lon		
Class A	18	1
Class B	4	27
Class C	9	3
Class D		
Radium		
Class A	23	8
Class B	47	14
Class C	167	14
Class D	8	9
Radium autopsy X ray		
Class A		
Class B	1	9
Class C	40	13
Class D		9

Rectovaginal and vesicovaginal fistulæ occur spontaneously in cases of cancer of the cervix There were 8 such cases in the entire series of primary cases (Table XIV)

The danger of fistula formation is apparently increased by any method of treatment thus hysterectomy alone gave 5 5 per cent cautery alone 5 6 per cent radium alone 5 7 per cent and cautery and radium 7 per cent

It would appear that the danger of fistula formation should not weigh heavily in the choice of methods of treatment

TABLE XIV —RECTOVAGINAL AND VESICOVAGINAL FISTULÆ

	Cases	Fistulæ	Per cent
Spontaneous	688	8	1
After hysterectomy alone	74	4	5 5
After cautery alone	5	3	5 6
After radium alone	363	2	5 7
After hysterectomy and radium	7	4	5 6
After cautery and radium	9	7	7
Other methods	38		
		47	

The value of radium as a palliative measure in the treatment of incurable cases is generally admitted (Table XV) That life is materially prolonged by the use of radium is hard to prove

Local healing of the disease in the cervix or vagina was noted however in 75 cases which failed of cure This of course means relief from the offensive discharge and hæmorrhages which are characteristic of the advanced stages of the disease

Table XV indicates the methods of treatment which resulted in local cure The small group of cases in which radium and X ray was used is perhaps most striking Of 0 cases 4 were cured of their disease and 6 obtained local healing Thus in 50 per cent of this small group the local lesion was destroyed

TABLE XV —LOCAL RESULTS OF TREATMENT

	Cases	C es	Local Healing
Hysterectomy alo e	4	19	3
Hyst rectomy and X ray		0	1
Hysterect my nd rad um	0	8	3
Radi m al	363	24	3
Rad m and X ray	20	4	6
R dium and pall t ve operat on	95	7	4
Ca tery alo	52	0	1
Othe method	2	1	0

Table XVI shows that the cases which showed recurrence after hysterectomy gave 7 cures by radium alone and 2 cures by radium and cautery Of 18 cases in which cancer of the cervix developed after a previous hysterectomy for fibroid only were cured and those by radium alone

TABLE XVI —RESULTS OF TREATMENT IN RECURRENCE AFTER HYSTERECTOMY

	C e	C es	P t
R cu rent after h sterectom	123	9	
By radi m alo e		7	
By ad um and caut ry		2	
Cance of cerv l tump	8		
By r di m alone		2	

An estimate of radium dosage in millicurie or milligram hours alone is misleading The amount of filtration and the distance must also be considered It is an interesting fact however that the average amount of local or contact radiation employed in the successful cases was 5 004 millicurie hour irrespective of deep γ radiation or X ray applied externally (Table XVII) Such an amount of radiation can be obtained only by very prolonged treatments (4 to 8 days) when radium tubes of only 25 or 50 milligrams are used The smallest dosage of radium used in the cured cases was as follows

	Millicu hours
Clas A	1 00
Cl ss B	1 725
Class C	2 00

The largest dosage in a cured case was 16 000 millicurie hours given in twenty nine treatments

In general during this period there has been a distinct tendency to abandon the many times repeated small dosage local treatment in favor of the single massive dose of radiation administered under an anæsthetic and with all the conditions of a surgical operation In certain well equipped clinics this is further supplemented by heavy γ radiation or X ray [1]

TABLE XVII —RADIUM DOSAGE (LOCAL)

	Average Millicurie Hours
57 cu d primary cases	5 004
A Class— 6 ca es	3 354
B Class— 8 cases	5 896
C Cla — 3 cases	9 455

Table XVIII shows the different varieties of cancer in 83 cured cases It is apparent that no uniform method of classification has obtained wide acceptance in the clinics here represented It is of interest however to note that the milder forms of the disease—adenocarcinoma and papillary carcinoma—are not by any means the only ones to be cured whatever agency employed

It is also of interest to note that of all the cases in which hysterectomy resulted in a cure in only 2 was evidence presented that the disease had extended beyond the uterus itself and in these two cases the pelvic lymph nodes were not diseased but cancer was found by micro copical examination in the parametrial tissue adjacent to the cervix

At th ses ion of on of the member f th Comm t ee th fol low s emen is made to plemen the report
Much area ion f md in th e hange mployed in adium ther py in this series of ses methods were con an ly hanging in the pe riod overed od t is probable that during his time methods ha bee ma erially improved It is the purpose of the C mmi ee to bmi la er eport dealing wi h the details of trea men with rad um bu mu t be remembered that no hing short of th ery best of d m reatmen as well h bes of surgic l skill, should be considered ade qua in dealing th this disease

TABLE XVIII — VARIETIES OF CANCER IN 8 CURED CASES

Adenocarcinoma	8
Adenoacanthoma	
Carcinoma	4
Epidermoid	5
Squamous cell	4
Solid	
Cylindrical cell	
Papillary	
Fibrillary	4
Total	3

SUMMARY

1 As a result of the study of the case record submitted to the committee certain conclusions may be drawn We would again emphasize the fact that this is to be regarded only as a preliminary report and that it is the purpose of the committee to collect further data and extend the time beyond the minimum period of 5 years so that knowledge of the more remote end results of these cases may be obtained The figures available to the committee are submitted and such conclusions drawn as seem justified by the results

2 Of 829 cases of cancer of the cervix 94 were free from disease 3 or more years after treatment More than half of these cures were obtained by the use of radium and X ray without radical operation There were no cures by cautery alone

3 In 243 cases of the 1 A and 1 B group (early favorable and border line cases) hysterectomy alone cured 1 in 3 with an operative mortality of 1 in 5 Radium with palliative operation (cautery) cured about 1 in 3 and radium alone (or with palliative operation) about 1 in 5 Under these conditions it may be said that the choice between operation and radium in the treatment of early and favorable cases of cancer of the cervix is an open one It is to be borne in mind that the results of treatment by radium used with the technique of the present day are not yet available but that it is generally believed that they will be better than the figures here presented

4 In more advanced cases (1 C and 1 D) the cures either by radiation or by hysterectomy were very few

5 The duration of life in the unsuccessful early cases is somewhat greater after radium than with operation

6 The formation of rectovaginal and vesicovaginal fistula occurred with nearly equal frequency with all methods of treatment

7 Radium with or without X ray or palliative operation was the most important agency in the destruction of local disease in cases which failed to obtain a cure The value of radium as a palliative measure in advanced cases is beyond dispute

8 In the treatment of recurrent cases after hysterectomy and in cancer of the cervical stump radium is to be preferred to other method

9 A sufficiently large dosage of radium is necessary to obtain destruction of the local lesion The treatment of cancer of the cervix with inadequate amounts of radium should not be encouraged

10 A uniform classification of the pathological varieties of cancer of the cervix is much to be desired

AIR EMBOLISM IN OBSTETRICS[1]

By JAMES A COUCH M D Chicago

FOR many years air embolism has been a subject of controversy among obstetricians the literature of a few decades ago abounds in instances cited as examples of air embolism With the development of bacteriology and the isolation of gas producing organisms fewer cases have been reported and the finding of gas in the heart and blood vessels at postmortem is no longer considered conclusive evidence of death from this cause That air if admitted in large quantities into the veins of animals would produce death was recognized in the seventeenth century and it is recorded that Rédi in 1667 killed horses and oxen by this means His method was crude consisting in inserting a cannula into the external jugular vein of the animal and then blowing several forceful expirations into the vein death resulting very promptly

The first case reported in surgery is that of Beauchene (2) in 1818 During an operation for the removal of a tumor from the neck a large vein was severed A peculiar hissing sound was heard and almost at the same instant the patient collapsed and died a few minutes later At the postmortem examination made within a few hours the right heart was found distended with air and death was attributed to this cause Because of the repeated occurrence of this accident in operations on the neck during the last century this region was the first to be considered one of the danger zone in the etiology of air embolism Further reference to the occurrence of this accident in general surgery I have purposely omitted from this article

EXPERIMENTS

Since the crude experimental work of Rédi many investigators have studied air embolism Virchow (30) Senn (28) Hare (13) Ivon Lesser (21) Perkins (26) McClintock (23) and Malcolm Goodridge (1) are among the best known names in this connection This work has in general been directed toward the solution of three problems (1) the quantity of air necessary to produce serious or fatal symptoms (2) the mechanism of death and (3) rational methods of combating the condition once it has occurred

1 *Fatal dose* The quantity of air required has been found to vary greatly in the hands of different experimenters no two having obtained quite the same results Blair and McGuigan (3) following an extensive study of the subject have summarized these variations very aptly in their statement The fatal dose varies enormously with the same and different species It is impossible to predict with any accuracy the quantity of air required to produce serious symptoms in a given case

2 *Mechanism* Small quantities of air on entering a vein are carried by the blood stream through the heart into the pulmonary circulation and escape through the pulmonary alveoli no symptoms are produced Larger quantities on entering the right heart interfere with the closure of the auriculoventricular valve and the compressibility of a gas as distinguished from that of a liquid prevents its being carried on into the pulmonary artery As a result the air is churned back and forth in the right heart and if the quantity is sufficiently large death ensues promptly as a result of the interference with the pulmonary circulation and consequent lack of oxygen supplied to the vital centers A somewhat smaller quantity of air will permit sufficient blood to be pumped through the pulmonary circulation to maintain life for a time the heart endeavoring to fulfill its function increases its rate to compensate for the diminished output with each systole Eventually however the myocardium is weakened and death results from the same cause as when a more massive dose is given although this may be minutes or hours later The only essential finding at postmortem is the dilated right heart filled with air

3 *Treatment* The treatment of air embolism apart from purely supportive mea

Read before the Chicago Gynecological Society January 4 (For discussion see p.)

sures has been directed toward the removal of the air from the heart Amussat (1) was the first to advise this procedure Nicholas Senn by aspirating the right ventricle was able to save three out of seven dogs on which he tried the procedure Goodridge followed aspiration by an infusion of normal saline into the vein thus saving nine of eleven dogs Blair and McGuigan obtained the best results by injecting 40 to 50 cubic centimeters of normal saline containing 2 cubic centimeters of 1 10 000 to 1 1 000 adrenalin chloride directly into the right ventricle Any of these measures to be effectual must be applied within a very few minutes of the onset of symptoms Delore and Dutell (9) aspirated the right heart of a man suffering from air embolism but were too late in their attempt

IN OBSTETRICS

The significance of air embolism in obstetrics was first recognized by Legallois(19) in 1829 who suggested that the entrance of air into the uterine veins might be a source of danger in recently delivered women But it was not until 1850 that Cormack(6) an English physician reported three cases as having occurred in his locality The following year George May (22) also in England reported three more cases Since that time many cases have been reported and from this number I have chosen only the most authentic and typical

MEDICOLEGAL ASPECT

Swinburne (29) in 1859 was the first to recognize the medicolegal aspect of this subject and reported a death from air embolism following an attempt at criminal abortion Many similar cases have since been reported among which I may mention those of Draper (10) Braun(4) Perkins(26) and Hektoen(14) The latter's report illustrates clearly the mechanism of this occurrence A nineteen year old woman about 4 months pregnant while taking a douche using a syringe filled with cold water collapsed and died in a few minutes The postmortem examination by Dr Hektoen revealed a large amount of air in the right heart The placenta was partially separated and many patulous sinuses were seen in the uterine wall beneath the detached portion some large enough to admit a pencil In the case cited by Perkins the placenta was attached relatively low and when the abortionist's instrument was introduced air was injected directly into the placental site

IN PLACENTA PREVIA

Among legitimate obstetrical operations none has been attended so frequently by air embolism as procedures undertaken for the purpose of saving the mother's life in placenta previa Kramer(17) Heuck(15) Lesser (20) and Krukenburg(18) were four of the earlier writers to report one or more cases of this kind and all under nearly identical conditions So nearly do the attending circumstances coincide that they may all be summarized in a few statements Hæmorrhage in the latter half of pregnancy having led to a diagnosis of placenta prævia in each case version was attempted and at about the time when the foot was drawn through the cervical canal the patient collapsed and died The fatal issue occurred suddenly in three instances but in Lesser's case the patient lived for 5 hours following the accident Careful postmortem examinations were made in each instance air embolism was the only apparent cause of death found In 1910 Peters (27) reviewed the literature and was able to find twelve cases including his own In the case reported by Esch(11) the placenta was completely detached in five other cases where special note had been made of this finding partial separation had occurred

MISCELLANEOUS

Three cases in which the uterine douche was used to free an adherent placenta ended fatally from air embolism Braun (4) reported one case Olshausen (24) and Huebl(16) the others Infrequently other obstetrical operations and manipulations have been attended by this accident Rarely has it occurred in strictly non operative deliveries Cordwent (5) case may be cited as an unusual one His patient insisted on getting out of bed during the expulsive stage and delivered standing The child fell to the floor dragging the placenta

with it The patient remained standing for a minute then cried out and died almost instantly The diagnosis was made at autopsy

Davidson(7) reported the case of a Hindoo woman who had an entirely normal delivery at term the placenta was expressed spontaneously The patient died suddenly 45 minutes later The postmortem examination made hours after death revealed air embolism

From this brief resume of cases occurring under a great variety of circumstances it is apparent that only one condition is necessary to produce death from this cause viz the admission of air in sufficient quantity to the sinuses *in the wall of the pregnant or recently* delivered uterus

MORBIDITY

The extreme infrequency of this occurrence is illustrated by the following Opitz (25) in 4500 deliveries never had a case of air embolism DeLee(8) states During the operation of uterine tamponade in placenta prævia the author had one case of collapse from air embolism (recovery) Williams(32) does not mention ever having observed a case Although admitting its occurrence he conveys the impression that bacteriological studies would show the presence of gas producing organisms in most of the reported cases

BACTERIOLOGICAL EXAMINATION NECESSARY

Welch and Flexner (31) in 1896 in reporting their work on the bacillus aerogenous capsulatus studied several cases in which the presence of gas in the vessels at postmortem had been considered evidence of air embolism but which they demonstrated was due to gas producing organisms The earlier history in some of these cases is that of a severe infection *rather than sudden death in a patient* previously well As an example They describe a case of a young woman 3 months pregnant who had a chill fever and general symptoms of an infection and who died 14 hours after the onset of the illness Postmortem examination revealed evidence of criminal abortion a generalized gaseous emphysema and gas producing organisms were recovered from the tissues Many of the cases cited in this paper antedate the careful bacteriological studies *of the present day* and for that reason cannot be considered clear cut examples of the condition

REPORT OF CASE

Mrs N age 25 white para II was admitted to the hospital at 8 a m July 31 1923 at term Temperature pulse and respiration normal Previous labor 2 years before had been entirely uneventful Her general health throughout this pregnancy had been good and although pus had been found in the urine on several occasions and pyelitis diagnosed there had been no serious subjective symptoms The present labor had begun about 4 hours before admission the membranes ruptured at 11 a m One eighth grain of morphine sulphate had been given at 1 15 p m

I saw the patient with Dr A B Hutchinson for the first time at 4 30 p m She was then having strong contractions every 3 minute she appeared tired and nervous but was otherwise in good condition pulse 90 blood pressure 130–90 Abdominal examination revealed the occiput and heart tones on the left well anterior head not engaged On rectal examination the cervix was found partially effaced and dilated about 6 centimeters One eighth grain morphine was repeated at this time with scopolamine one two hundredth grain and patient was allowed to rest One hour later rectal examination revealed the cervix completely dilated except a very narrow band in front the head still above the inlet no other fetal part presenting

At 5 50 p m preparations for delivery were begun While these were in progress the cord prolapsed and protruded from the vulva about 8 inches Sterile linen was applied and ether anæsthesia begun The cord was found pulsating fetal heart tones 120 good quality With the onset of the next contraction the cord pulsation ceased and the cord remained collapsed when the uterus relaxed Vaginal examination at this time revealed the head still high cervix completely dilated Several attempts were made to replace the cord above the head but were without success It remained collapsed and lifeless throughout these maneuvers and the fetal heart tones increased to 160 per minute

The liquor amnii had entirely drained away and the uterus was contracted down snugly around the *child* Version under these conditions attempted on a patient only lightly anæsthetized seemed inadvisable Simpson forceps were applied an episiotomy was done and the child delivered The infant a male weighing 7 pounds 6 ounces was deeply asphyxiated but responded readily to simple resuscitative *measures at no time* was there any evidence of intracranial injury

The child had just been delivered when the anæsthetist reported that the patient had suddenly collapsed and that her pulse was extremely rapid

and thready The placenta was expressed spontaneously there was only slight bleeding and no satisfactory explanation could be made to account for the serious symptoms then present

The pulse was not perceptible at the wrist but could be obtained easily over the abdominal aorta and was counted at 160 It continued above 150 per minute to the end Dyspnœa was marked for the first few hours and then seemed less distressing Pallor was extreme the mucous membranes being blanched white cyanosis developed shortly before death Within a relatively short time after the delivery the patient regained consciousness She was able to answer questions for the first hour or two then coma supervened Dyspnœa was the only symptom complained of no abdominal pain or tenderness could be elicited There was no distention no dullness in the flanks or other findings suggestive of intraperitoneal hæmorrhage The uterus remained firmly contracted Repeated auscultation of the heart revealed nothing but the very rapid rate The patient was extremely restless tossed about continually and required several attendants to restrain her in bed Death occurred at 1 15 a m August 17 hours postpartum respiratory failure with deep cyanosis preceded the cessation of the heart action

The postmortem examination was made 9 hours after death by Dr H Gideon Wells of the University of Chicago

Postmortem report External appearance The body is that of a well nourished well developed young woman of about 30 years of age The skin is white There is no icterus The mammary glands are well developed and colostrum can be expressed from the nipples Marks of saline infusion under each breast The abdomen is prominent with pigmentation along the midline Lineæ gravidarum are present The pubic hair has been recently removed There is slight œdema about the ankles A laceration of the perineum is present Body heat is still present

Abdominal cavity The odor of ether is perceptible as soon as the abdominal cavity is opened There is about 1 centimeter of subcutaneous fat in the abdominal wall at the midline There are no adhesions in the pelvis no hæmorrhages The peritoneal cavity is everywhere normal no excess of fluid no signs of inflammation and no adhesions except for a few between the gall bladder and the transverse mesocolon

Pleural cavity The pleural cavities are both normal The diaphragm is at the second interspace on the right at the third rib on the left

Pericardial cavity The pericardial cavity is normal no excess of fluid and the surfaces are smooth

The mouth and pharynx were not examined

The larynx and trachea were not examined

The œsophagus was not examined

Thyroid and thymus The thyroid was not examined There is a moderate amount of thymus tissue present

Heart aorta and vessels The blood is not completely clotted The right ventricle is markedly dilated with flabby walls which appear transparent When opened under water the right ventricle is found to contain much free air and frothy blood also escapes from it The pulmonary arteries also contain frothy blood The pulmonary arteries are free from thrombi The heart is of normal size The heart muscle is pale The valves are normal The blood elsewhere does not contain air or bubbles There are no signs of postmortem decomposition

Lungs There is an old puckered scar on the right apical pleura which represents an old tuberculous lesion The lungs were otherwise normal externally They were not removed or opened Contained no areas of consolidation

Peribronchial glands The peribronchial lymph nodes are not enlarged caseous or calcified

The liver is pale and soft but appears normal The spleen is normal in size and appearance The pancreas is normal The gastrointestinal tract is normal The appendix is normal The adrenals are of good size but normal in appearance The cortex exhibits a deep yellow color and contains much lipoid The left kidney is soft and wet The contents of the pelvis are yellow and turbid pus indicating a distinct pyelitis The kidney is somewhat swollen and the cut surface bulges The capsule strips freely leaving a normal surface The cortical striations are normal The right kidney resembles the left in all respects The bladder is normal

General genital organs The uterus reaches nearly to the umbilicus The cavity of the uterus is covered with clotted blood and is eroded as in recent delivery The placenta was attached to the posterior wall It represents a normal recently delivered uterus The tubes and ovaries are free The left ovary contains a corpus luteum about 15 millimeters in diameter

Lymph glands superficial The superficial lymph glands are not palpable The mesenteric and retroperitoneal lymph nodes are not enlarged

The brain and meninges were not examined The spinal cord was not examined The musuclar system was no mal The skeleton was normal

Histology Microscopic examination of tissues showed no pathological changes There was no evidence of gas bacillus infection Examination of the blood showed no bacteria

Final anatomical diagnosis Air embolism—air in heart and pulmonary vessels dilatation of the right ventricle recently delivered uterus lactating mammary glands corpus luteum in left ovary scar of healed tuberculosis lesion in right pulmonary apex acute pyelitis acute parenchymatous degeneration in kidneys

SUMMARY

1 Air embolism although occurring rarely is a grave complication of obstetrical operations

In the vast majority of reported cases the possibility of gas bacillus infection has not been definitely excluded

3 A case is reported in which the diagnosis made at postmortem was verified by negative bacteriological findings

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after he attempted to walk to the telephone in the same room and was found unconscious on the floor about half an hour later Returned to her bed he noticed the first pain in this attack Pains were general over the abdomen and cramp like in character Shortly after this she vomited and again became unconscious She did not regain consciousness until some hours after the operation at the hospital

Patient was admitted in profound shock with signs of severe internal hæmorrhage and no external bleeding Her condition was so grave that she was sent at once to the operating room The abdomen was found filled with blood fluid and clots fetus and placenta were free in the abdominal cavity the uterus was firmly contracted in the pelvis

Hysterectomy was done No blood was removed from the abdominal cavity that could be left and 800 cubic centimeters saline solution was introduced 800 cubic centimeters citrated blood and 400 cubic centimeters saline solution were given into the vein during the operation

The patient was up on the twelfth day and discharged on the nineteenth day after the operation

This patient had been delivered by cæsarean section on account of eclampsia 2 years before at which time she left the hospital in 14 days but there was some discharge from the wound for about 1 month

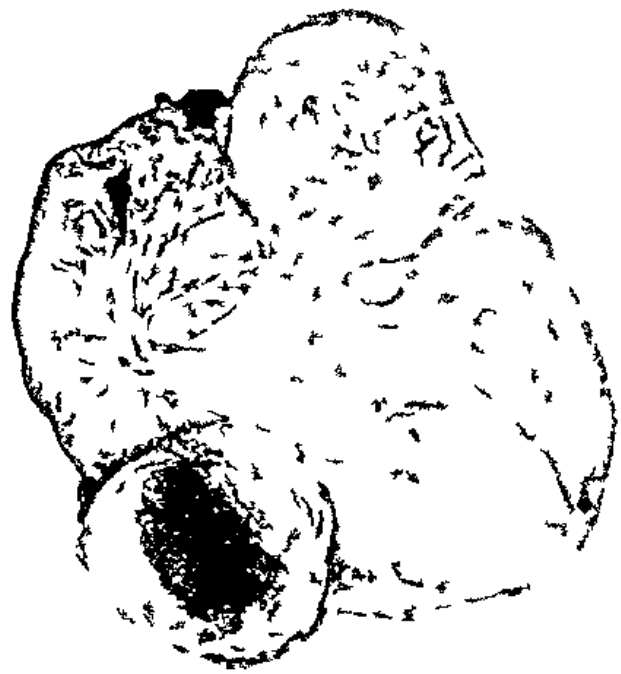


Fig 1 Photograph of specimen removed from Case 4

1 The scar of the classic cæsarean section may rupture not only during labor but at any time during the last 3 months of pregnancy

Two of the cases reported had fever following previous cæsarean sections in two the puerperium was afebrile

3 In these cases the location of the placenta over the scar seemed to have no influence The sections show fragments of syncytium over the scar in two and in two there are no signs of placental tissue in this location

4 Trauma may have had a place in the etiology in one patient Case 4 The patient fell to the floor in a faint before the pain began The pain severe and sharp was the first symptom noted in the other three cases The uterus ruptured while the patient was asleep in bed in Case

5 The rupture in the cæsarean scar often allows the uterus to empty itself completely permitting good contraction and retraction which stop hæmorrhage

6 External bleeding was not present in any of the four because labor had not begun and the cervix was closed External bleeding is a very common sign in rupture of uterus during labor

7 Scar tissue was present in abundance in the section of all of these cases and the line of rupture was in the scar tissue

8 In each of these cases the uterus was found opened by an incision in the median line of the anterior wall extending from the upper limits of the cervix to the fundus The contraction of the uterus held the edges of the wound so far apart that they could be approximated only with great difficulty

9 It is believed to be good practice to remove the uterus in these cases because of the time required to freshen scar edges and the danger of a second rupture in subsequent pregnancy

LINITIS PLASTICA[1]

By JOHN H LYONS M D Rochester Minnesota
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THIRTY EIGHT cases observed at the Mayo Clinic in which the diagnosis of linitis plastica or leather bottle stomach was made at operation were studied The walls of the stomachs were thickened and hard and had lost their elasticity In 25 cases specimens were obtained at operation for microscopic study Fourteen of the twenty five specimens were diagnosed small cell carcinoma Six others were diagnosed as non malignant two of these were reported as inflammatory one as diffuse gastritis with marked thickening of musculature especially at the pylorus one as fairly marked fibrosis and thickened wall one as ulcer greatly thickened submucosa and muscularis with marked round cell infiltration and fibrosis and one as single simple shallow ulcer and extensive fibrosis extending through to the serosa The six patients died shortly after operation and further microscopic study of the operative specimens revealed small cell carcinoma in all In the remaining five cases the operative diagnosis was linitis plastica but microscopic examination revealed lesions other than the small cell carcinoma In one of these cases the microscopic diagnosis was syphilis in one simple gastric ulcer in one simple muscular hypertrophy in one adenocarcinoma and in one colloid carcinoma

Various lesions may produce almost identically the same gross specimen for example the thickened gristly stomach described by Brinton This probably explains the difference of opinion with regard to the benign or malignant nature of linitis plastica It probably also explains the varying results from surgical procedures

While several lesions may sometimes present the characteristics of linitis plastica I believe the term should be reserved for those cases in which small cell carcinoma is found In 80 per cent of this series of cases in which a specimen was obtained the microscopic diagnosis was small cell carcinoma These cases represent the only well defined group and if the term linitis plastica is not thus limited it will have to cover a multitude of conditions

If the term linitis plastica is limited to the cases of small cell carcinoma we would not expect to find very frequent occurrence of the various factors which have been suggested as of etiological importance namely syphilis tuberculosis arteriosclerosis alcoholism and heart disease And such is the case One of our patients had been a chronic alcoholic one gave a history of syphilis and one had had attacks which were very suggestive of angina pectoris None of the other patients had anything in their histories which has been suggested as a causative factor

The youngest patient was 34 years of age the oldest 71 years The average age was 52 years The one fact that stands out is that linitis plastica is a disease of the cancer age There were 23 men and 10 women This is in keeping with the relative frequency of occurrence of gastric cancer in men and women

SYMPTOMS

The symptoms in these cases were similar to those in cases of gastric carcinoma in general The average duration was 23 months The longest was 15 years one patient had had symptoms for 10 years and another for 8 years The long duration of symptoms brings up the question of whether or not this form of cancer may arise from gastric ulcer The shortest duration of symptoms was 3 weeks Excluding the three patients whose symptoms lasted 8 10 and 15 years the average duration of the illness was 10 months which is probably more correct The common symptoms were pain and loss of appetite weight and strength Gas belching and nausea and vomiting were also common complaints Several patients said that they could not eat much without feeling full Only one patient had had gross gastric hæmorrhage All of the patients had had pain in the epigastrium in

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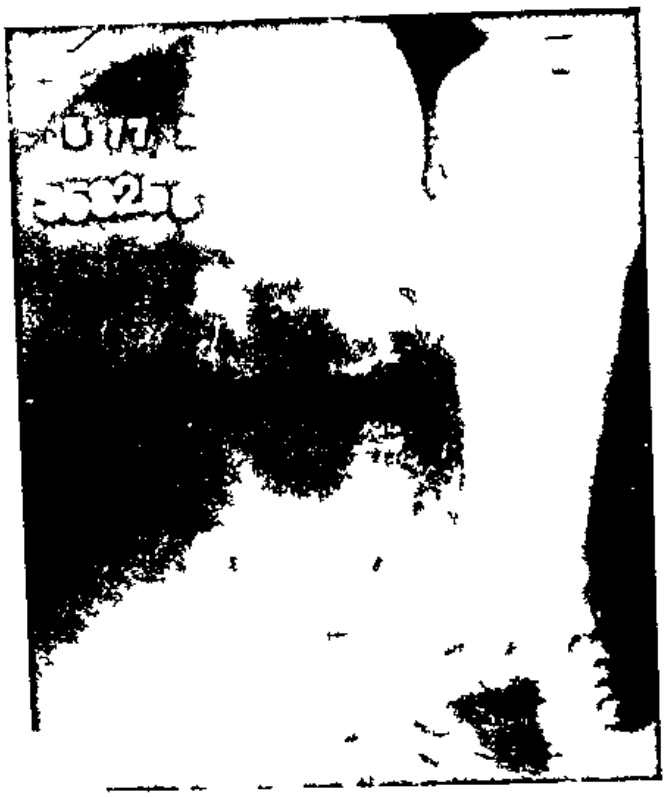


Fig Central linitis plastica



Fig Generalized linitis plastica Cross specimen Stomach opened along lesser curvature

certain instances brought on by eating but in almost as many instances food gave relief One patient had had epigastric pain with food relief for years but 4 weeks before coming to the Clinic food began to aggravate the pain another point which raises the question of the development of this type of cancer on ulcer

The average loss of weight was 21 pounds

Achlorhydria was the rule Twenty two patients had no free hydrochloric acid but 8 had free acid ranging from 6 to 30 The test meal given to 3 patients was unsatisfactory

Linitis plastica cannot be diagnosed by the X ray The localized form cannot be differentiated from cancer and in the generalized form the picture is not different from that of a cirrhous cancer The gastric cavity may be reduced to a narrow tube and initial clearance of the barium meal is early and voluminous Peristalsis is absent in the involved area In the generalized form the gastric walls are rigid and move away from the palpating finger instead of being indented by them (Fig 1) A mass was palpated in the epigastrium in 24 of the 33 cases but this would be expected considering the great thickness of the wall of the stomach

PATHOLOGY

The lesion may be localized or involve the whole stomach The generalized form is the late stage of the local lesion One of the patients in the series had had a gastroenterostomy because of a tumor of the pylorus with thickening along the lesser curvature He did well for a time and then began to vomit and lose weight and 1 year later an exploratory operation showed that the process had extended considerably Operative procedures were not continued The other patient had had cholecystectomy at the Clinic and the surgeon had noted a thickening just above the pylorus which he thought was due to extension of inflammation from the gall bladder The patient returned to the Clinic after 2 years complaining of epigastric pain anorexia nausea vomiting and loss of weight Exploration at this time revealed that the entire stomach was thickened and a diagnosis of generalized linitis plastica was made

Certain authors have mentioned a form of linitis plastica in which the stomach is in



Fig 3 Mucosa and submucosa of pyloric portion of stomach showing gland buds and cell infiltration (X60)



Fig 4 Mucosa and submucosa of pyloric portion of stomach showing gland buds and cell infiltration (X130)

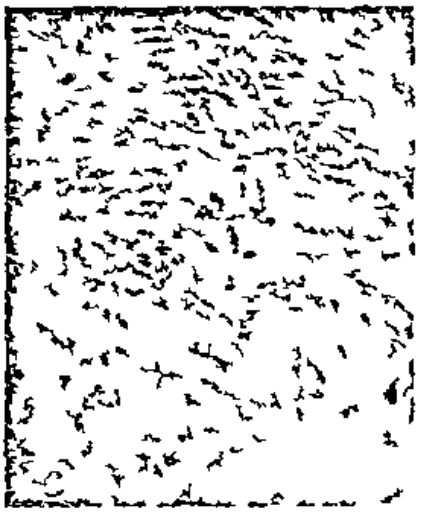


Fig 5 Submucosa of pyloric portion of stomach showing cell infiltration with a few scattered lymphocytes (X60)

volved in patches There was none such in this series Others have reported cases in which the process also involved other viscera particularly the intestines Many of these cases are probably some form of polyserositi although others are undoubtedly malignant processes There was one such in the series At operation the entire stomach was stiff and thickened and there were several thickened areas throughout the peritoneal cavity There were two liters of free fluid in the peritoneal cavity A gland was removed from the omentum and diagnosis made of metastasis from small cell carcinoma to lymph gland

The involved portion of the wall of the stomach is characterized by marked thickening and loss of flexibility On palpation it feels gristly The peritoneum over the lesion is not transparent and glistening as normally but pearly white If the process is still localized and is in the pyloric region where most of the lesions start it may result in obstruction with dilatation of the part of the stomach proximal to the obstruction When the process has spread so as to become generalized the stomach usually is contracted and converted into a rigid tube Even in the generalized form the greatest thickness and rigidity is usually near the pylorus and the cardia is the least involved The lesion does not end abruptly at any stage but passes gradually over into the normal stomach

On cutting through the thickened wall of the stomach the different coats are clearly discernible But even though the coats can readily be differentiated they do not offer the same contrast as under normal conditions The submucosa may be increased ten to twenty times its normal thickness the subserosa and serosa even to ten times the muscular coat five to eight times and the mucosa two to three times The mucosa sometimes is wrinkled being thrown into quite heavy rugae This is probably due to contraction in the other coat (Fig 2)

Glandular involvement is relatively as common as in other cases of gastric carcinoma In the 23 cases there were 15 with glandular involvement

The presence or absence of ulceration could be determined definitely only in cases in which resection was performed Ulceration was present in 5 cases This is in marked contrast with the findings of Thomson and Graham who found ulcer always associated with the condition

The microscopic picture is characteristic The mucosa may be practically normal and is sometimes thrown into rugae Degenerative changes in the cells and sometimes even ulceration may be present resulting most probably from disturbance of the blood supply by the contracting connective tissue fibers (Fig 3 and 4) This connective tissue



F 6 Submucos in h t plas t ca mitotic fi re Th on ect i ti ue i most bu dant h and i resp ble for th thickenin of this coat (X)



F 7 Mu c l n in lin t pl s tica Hyp rt phi d muscl nte spers d ith b nds f fibr u ti e Canc ell s attered th h fib ous t ue (X60)

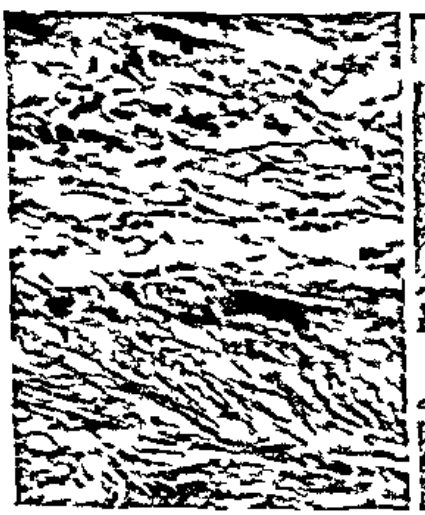


F 8 Mu culan n lin ti pl tic a fib ou t ue b mu cle ca r ell The musc l r element ar m k dly hypertrophied and nt persed by b d of con ecti e tissue

i most abundant in the submuco a and is re ponsible for the enormous thickening of this coat but fibers also pass from the sub mucosa through the muscularis and subsero a to the serosa These fibers pass in every direction through all the coats interlacing with each other and surrounding the blood vessels The contraction of the fibers around the blood vessels is responsible for the blood less stomach which several writers have mentioned (Figs 5 and 6)

The muscular elements of the muscularis are markedly hypertrophied and interspersed by the band of connective tissue extending through from the submucosa This muscular hypertrophy is hard to explain but is probably the result of the increased work thrown on the gastric muscle by the deposition of fibrous tissue in the walls of the stomach (Figs 7 and 8)

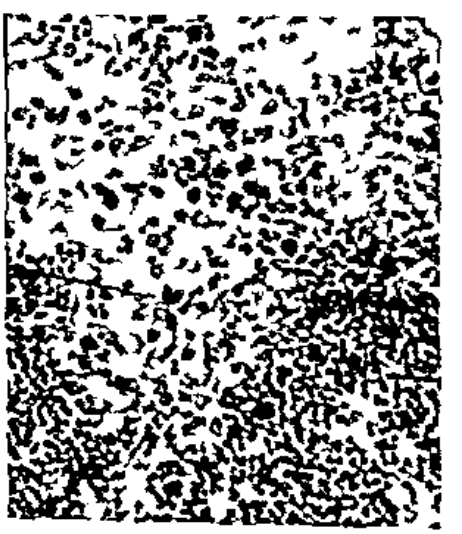
The subserosa is thickened and solidified because of the presence of the same connec



F g 9 Se osa d bse a n l ti pla t G t se n fibro t ss with ce ll cat t red through t (X 5)



F g o Meta t f m ll-cell c ce l mph gl d r cell b lymphoc tes prob bl h h grade mal y meetin great esist



F t M t t of m ll-c ll lymph gl d c e cell b lymphocyt The pres n f these c ll d in th diag o

tive tissue elements with resulting obliteration of blood vessels which in turn cause the changes in the appearance of the peritoneum namely the loss of transparency and glistening appearance (Fig 9)

Scattered throughout all the coats but most marked in the submucosa are numbers of small cells with large nuclei They resemble epithelial cells in all respects Practically every one writing on linitis plastica has mentioned these cells but many while commenting on their similarity to epithelial cells have believed them to be connective tissue elements In some places they are grouped together in large masses and in others they seem to be advancing in single file through the lymphatics Mitotic figures are not very numerous The process probably represents a high grade malignancy meeting with great resistance on the part of the subject (Fig 10 and 11) The cords of cells advancing through the lymphatics of the subserosa aid in the diagnosis of the condition The involved lymphatics of the subserosa can often be seen through the peritoneal coat as a network of fine white lines This cannot be said to be characteristic of linitis plastica as any type of carcinoma or tuberculosis might produce the same condition But the presence of such a network in a case suspected to be linitis plastica would rule out syphilis or any other inflammatory lesion except tuberculosis The latter occurs so rarely in the stomach that it need hardly be considered

END RESULTS

Excluding the five cases in the series in which microscopic examination revealed a lesion other than small cell carcinoma there were fifteen explorations three gastro-enterostomies and fifteen resections with six operative deaths an average mortality of 18 per cent Of the 27 patients who survived operation 1 are dead

RENAL INFECTIONS[1]

By JOHN H CUNNINGHAM M D F A C S and ROGER C GRAVES M D Boston

RENAL infection is like an evil spirit always to be feared manifesting itself with such frequency that it becomes one of the most common conditions with which the urologist has to deal It is a condition we try constantly to avoid a condition we are most concerned about treating and a condition which in spite of all is the cause of death in most of our cases

My reason for bringing this subject before you is that one of my associates Dr Roger C Graves has recently completed experimental work which is of the greatest practical importance in explaining the common occurrence of renal infection as a complication in connection with many of our patients particularly those with urinary obstruction

The route by which bacteria reach the kidney in cases of renal infection has been the subject of controversy for many years The early theory that all such diseases occur as a result of direct ascent of infectious material from the lower part of the urinary tract has been denied in many later writings Indeed it has given way to the view that these infections are blood borne in every instance The latter belief has been so firmly upheld in recent years that we have been led to feel rather generally that the ascent of infection along the ureter is a most remote possibility if indeed it occurs at all On the one hand there exists a paucity of evidence that ascending renal infections are clinical possibilities On the other hand we are confronted by indisputable facts concerning the kidney and its relation to bacteria carried by the blood stream Without further discussion it may be said that we know both from experimentation and abundant clinical experience that hæmatogenous infection of the kidney occur and that they probably predominate However the attitude that the blood stream is the only route of invasion does not seem reasonable in spite of the fact that concerning the alternative there is no positive proof All of us are familiar with cases which suggest most strongly an ascending infection indeed there are repeated instances in which no other explanation seems probable Because this is true and because the work on this subject has left many points undetermined it has seemed to us worth while to undertake a more complete investigation

By ascending renal infection must be understood of course the passage of bacteria from the bladder to the kidney along the path of the ureter either through its wall or by way of its lumen Three types are conceivable

1 Extension upward along the ureteral wall through its lymph vessels There is little evidence on anatomical grounds for such an occurrence the lymphatics of the ureter being arranged segmentally instead of continuously from bladder to kidney but even if anastomosis between segments permits a continuous lymph stream the considerable amount of experimental work done on the subject has failed to prove satisfactorily that infection ascend along this channel

Extension of infection along the lumen of the ureter through and against the column of descending urine A passive ascent of this sort can only take place obviously *in those* cases in which disease of the ureter distorting the intravesical segment *makes possible* a free communication between bladder and renal pelvis Such conditions exist are fortunately not too common and need no further comment

3 Extension of infection along the lumen of the ureter anatomically intact in which the bacteria are carried upward through the force of bladder regurgitation It is this highly interesting possibility with which we are concerned and we find that it has already been made the subject of a considerable amount of investigation

Credit for the first efforts along these lines must be given to Semblinow who in 1883 determined with experimental animals that regurgitation of the vesical contents is possible under normal anatomical conditions He

[1] Read before the Southern Branch of the American Urological Association in connection with the meeting of the Kansas City Clinical Society and the Medical Society of the Southwest Oct be 9 3

produced reflux by mechanical stimulation of the ureter in a dog whose bladder had been filled with colored fluid Further work was done in later years by Lewin and Goldschmidt Courtade and Guyon Marcus Wislocki and O Conor Time will not permit a discussion of their results but they found little difficulty in obtaining regurgitation in normal animals

In a paper concerning the hydraulic distention of chronically infected small contracted bladders Young in 1898 considered the possibility of reflux and concluded that the normal ureteral valve and the oblique course of the ureter in the vesical wall afforded adequate protection against it He filled to the limit of capacity the bladders of cadavers and failed to produce regurgitation

In addition to this experimental work Kretschmer in 1916 made an exceedingly valuable clinical contribution to the problem He observed in a study of the normal bladder by means of cystograms that the ureters often filled with opaque solution This regurgitation occurred three times in a series of ten normal children under ether anæsthesia In one adult also with a normal urinary tract as proved by cysto copy reflux was shown in the cystogram During the examination the patient had a great desire to urinate and Kretschmer believed the regurgitation to have been the result of increased tension through straining Reflux was again shown to occur in three cases with disease of the vesical outlet in which however cystoscopy had revealed what appeared to be normal ureteral orifices

These facts and others together with the repeated clinical phenomena which seem only to be explained on a basis of regurgitation have led the authors to believe that the subject warrants more comprehensive study than it has yet been given In reviewing the situation we find that regurgitation of vesical contents has already been established as an experimental fact and as a clinical probability but that little has been offered concerning the condition under which it occur and the factors which produce it With the purpose to answer if possible some of these question the experimental work by Graves here recorded was undertaken

The technique used throughout the experiments was based upon certain fundamental procedures which we will outline in detail In the series under discussion the experiments were carried out on male rabbits In most instances the animals were anæsthetized with urethane given by means of a stomach tube and morphia given subcutaneously After an interval usually of 30 minutes allowed for satisfactory anæsthesia the animal was placed in a warm chamber in which body temperature was maintained by a thermostat and equalized throughout by means of a small electric fan A mid line incision opened the peritoneum from ensiform to pubes The rectum was usually doubly tied and cut and the intestines were reflected upward and to one side where they were enclosed in a towel moistened with warm physiological salt solution For this procedure it was only necessary in addition to dividing the mesocolon to ligate and cut the inferior mesenteric artery The vessel was divided peripheral to the inferior mesenteric ganglion and its fibers In this way the bladder and the ureters throughout their extent were exposed to view The tissues were kept moistened with physiological salt solution at body temperature To exclude the possible effects of a shock a few experiments were performed in which the rectum was not cut across the intestines being merely turned aside to expose one ureter and we found this preparation no more favorable for the production of regurgitation than the other In numerous cases the abdomen was not opened at all until the close of the experiment The bladder was emptied of its contents through a small soft rubber catheter passed along the urethra When all preparations were complete we usually allowed an interval varying from 15 to 45 minutes before actually beginning bladder filling During this period body temperature was re established in the chamber if any slight drop had occurred Moreover and perhaps of greater importance the bladder musculature was given a rest period in the empty state

From a burette the maximum hydrostatic pressure of which was about 50 millimeters mercury the solution to be used was slowly

introduced through the catheter into the bladder The fluid in all cases in this series was physiological salt solution (85 per cent) colored with small quantities of methylene blue or India ink for purposes of increased visibility A coil of tubing immersed in a water bath and inserted between the burette and the catheter served to maintain body temperature in the solution introduced The rate of flow into the bladder ranged from 1 to 2 cubic centimeters a minute A mercury manometer in open communication with the system made it possible at all times to read intravesical pressure Filling was continued until positive results were obtained or until such time as further filling would have been beyond physiological limits of distention

SERIES A A SERIES OF NORMAL RABBITS THE BLADDERS OF WHICH WERE FILLED WITH WARM PHYSIOLOGICAL SALT SOLUTION

In this series are included experiments upon 75 male rabbits with a total of 76 bladder fillings It was our purpose to simulate as closely as possible the normal vesical distention Body warm physiological saline was slowly introduced and trauma in the preparation of the subject was reduced to a minimum By this means we were able to secure regurgitation of vesical contents into the ureter in a total of 73 7 per cent of cases Most of the failures occurred in the early stages of the work when we were less familiar with the technique of preparation In the second half of the series we produced regurgitation in 86 8 per cent of the attempts A typical experiment proceeded about as follows At the beginning of bladder filling both ureters were acting vigorously each presenting three peristaltic waves per minute and each wave obviously accomplishing the transportation of a considerable amount of urine When ten cubic centimeters had been introduced into the bladder the ureters were still active and the bladder was elongated and apparently resisting distention actively as shown by its cylindrical form Pressure 5 millimeters mercury With 10 cubic centimeters the pressure was 9 millimeters mercury The bladder was quiet and both ureters were active With 26 cubic centimeters there was



Fig 1 Bilateral pyelogram made by normal ureters the left duplex through right kidney after injection of calculent

a sudden rush of a blue column of fluid from the bladder into the left ureter filling its lumen to the kidney Similar reflux soon followed on the right Pressure 18 millimeters mercury Ureteral waves rapidly increased in frequency now acting 8 to 10 times a minute At first these waves successfully pushed the blue columns downward Gradually however the contractions grew less effective until finally the ureters becoming more and more feeble lay blue and motionless

Thus we have demonstrated again conclusively that regurgitation of vesical contents is an experimental fact To be sure as we have previously stated so much has been shown by earlier workers but there has thus far been no satisfactory explanation of the phenomenon As it has been our purpose to determine if possible the conditions under which reflux occurs a careful review of the results of the present normal series will be of value



Fig. Acute inflammation of the bladder. Note the long contracted fibers surrounding the mucosa.

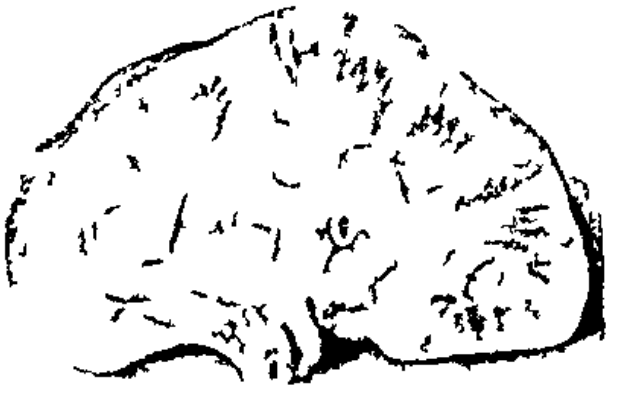


Fig. Acute inflammation of the bladder. Note the increased length of the muscle fibers.

Concerning anesthetics suffice it to say that nine different combinations were used of urethane paraldehyde morphine and ether. As far as could be determined the type of anæsthetic and the fact of anesthesia as such were of relatively small importance.

It was of interest to observe the varying amounts of urine present in the animals at the start of the preparation. In 53 of the 73 cases the bladders were either empty or contained 10 cubic centimeters or less. In 88 per cent of these cases regurgitation occurred while in those cases in which the bladder contained moderate or large amounts of urine only 44 per cent showed reflux. From this experience it appears to us that at a given time any given bladder possesses the ability to raise and maintain a definite pressure with a given quantity of fluid entirely different from the pressure which the same bladder can develop at another time under different conditions.

The vermiform activity of a filling bladder is caused by rhythmic contractions of the musculature stimulated by gradually increasing distention. As the upper limits of intravesical tension are approached these rhythmic movements cease to be apparent and in their stead occurs a sustained contraction of the bladder wall upon its content. It is in this tonic state that pressure within the bladder rapidly rises until such level are reached as render reflux possible. In this period of rhythmic activity the muscle fibers are lengthening as filling proceeds. The intermittent contraction represent a sort of clonic response to the stimulus of stretching or distention. Later further stretching is continuously resisted and the state of tonic sustained contraction is reached. In other words the bladder apparently at first responds to the gradual filling isotonically that is by increasing the length of the muscle fibers without changing the tension (except for the periodic contractions described above). Finally when a sufficient quantity has been introduced the response becomes isometric the fibers maintain the same length and respond to the stretching force by a rapidly increasing tension.

Our experiments demonstrate the fact that reflux is attained most rapidly in those bladder in which the response tend to be isometric from the start. In some cases tone was so active and the isometric state was reached so soon that intermittent contraction were not observed at all and in these cases reflux pressure levels were developed with surprisingly small quantities of fluid. In a majority of the experiments however a rhythmic activity preceded the final tonic resistance to filling. A third type of bladder occurred so lacking in tone that muscular contractions failed to appear at all or did not get beyond the rhythmic state. These bladders presented no active resistance to filling and in them the pressure finally engendered was purely a passive mechanical tension produced because the sac could hold no more. In such cases regurgitation never occurred.

The average quantity of fluid used in bladder filling in this series was 49 cubic centimeters and in the second half of the series 30 cubic centimeters These quantities are not excessive in rabbit bladders for we have frequently found much larger quantities of urine in these animals at the time of preparation Moreover intravesical tension does not depend primarily upon the amount of fluid in the bladder but rather upon the tone of the bladder musculature The average intravesical pressure at the time of reflux throughout the series was 13 6 millimeters mercury The lowest regurgitation pressure was 4 millimeters of mercury reached with 11 cubic centimeters of fluid (experiment No 91)

In passing it may be mentioned that this work has afforded particular opportunity to observe the effect of bladder distention upon ureteral activity When the bladder begins to fill there is a speeding up of peristalsis With greater degrees of retention and increased intravesical pressure the ureter acts more slowly but more vigorously Where intravesical pressure has reached a relatively high level the organ again speeds up in frequency but becomes dilated and increasingly ineffective in emptying its load Finally fatigued and overdistended its waves become mere ripples and eventually cease In other words there has developed a ureteral retention which is inevitably associated with bladder retention a fact too little regarded in clinical considerations and one which gives definite significance to the term back pressure in prostatic obstruction

Keeping still in mind the question of back pressure it seems to us of especial interest that after regurgitation the bladder pressure is transmitted directly to the renal pelvis the two structures being in open communication This we demonstrated in six cases in which we measured the intrapelvic pressure by means of a water manometer The latter was attached to a small cannula passed into the pelvis through the kidney parenchyma The average bladder pressure at the time of regurgitation in these cases was 18 millimeters mercury while the pelvis pressure was 20 9 millimeters of water or about 20 7 millimeters mercury the difference not being beyond the limits of error When the vesical tension is reduced pelvic pressure remains elevated until the ureteral contractions produce sufficient emptying to lower it No reduction in pelvis pressure occurs if the ureters remain inactive In experiment No 11 for example reflux occurred with a bladder pressure of 22 millimeters mercury Pressure in the renal pelvis promptly rose to the same level Upon emptying the bladder the ureteral orifice apparently closed and no waves occurred in the ureter for pelvis pressure still remained 2 millimeters mercury



Fig 4 Acute inflammation of the kidney with abscess formation Note medullary tubules filled with polymorphonuclear leucocytes

SERIES B RABBITS IN WHICH THE URETERS HAD BEEN DISTURBED IN PREVIOUS OPERATIONS

This group consisted of 4 bladder fillings in 38 male rabbits In each case the normal conditions existing in one or both ureters had been disturbed in a previous operation performed either some weeks before or immediately preceding the experiment In 15 animals the operation had produced obstruction in the left ureter varying in degree from slight to absolute obliteration of the lumen by means of aluminum or elastic bands and silk ligatures In 18 cases the ureters were doubly

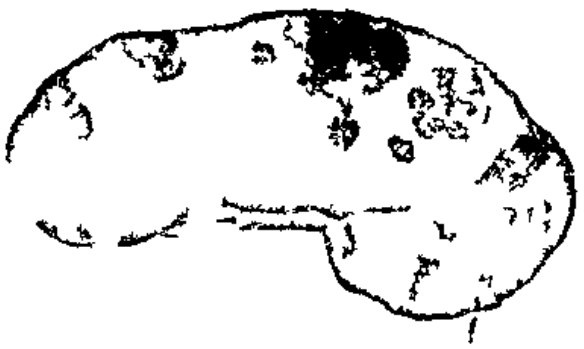


Fig 5 Acute inflammation of the kidney of diffuse type Note the extent of the inflammation

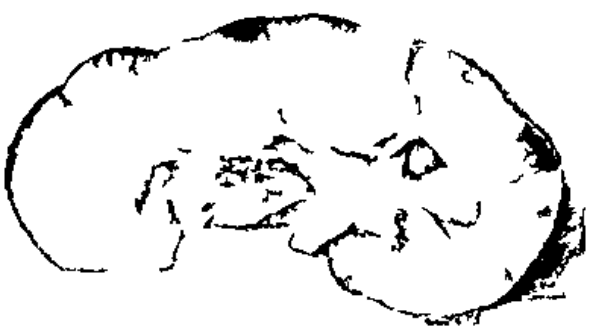


Fig 6 Acute inflammation of the kidney of diffuse type Note the extent of the inflammation in the cortex striking and the wedge shaped

tied with silk and cut across just before the beginning of the experiment In 5 rabbits the left kidney and ureter were dissected free from all nerve and blood supply down to the bladder wall itself in order to render that side entirely motionless Otherwise the conditions of experimentation were essentially the same as in Series A

Taking the series as a whole we succeeded in producing reflux in 33 of the 4 attempts Of the 5 in which the left side had been rendered motionless regurgitation occurred in four Of the 18 cases in which the ureters were doubly tied and cut reflux was obtained in 1 and of the 19 vesical fillings in the remaining group 17 resulted in regurgitation

Obviously then the degree of ureteral activity is of slight importance in the production of regurgitation In further sharp contrast to the beliefs of other workers it may be said that reverse peristalsis of the ureter was found to have no part in the phenomenon

SERIES D ROENTGENOSCOPIC OBSERVATIONS

It has been our desire to produce regurgitation under conditions as nearly normal as is consistent with experimental study In order to eliminate as many as possible of the artificial factors we have made a series of observations on perfectly intact animals This we accomplished by fluoroscopic examination Aside from an eighth grain of morphia and a whiff of ether during the adjustment of the catheter no anæsthetic was used The animals were placed upon the X ray table and the bladders were slowly filled with warm 5 per cent sodium bromide solution colored with India ink Observations were made at brief intervals by means of the fluoroscopic screen until regurgitation was seen or until it was obvious that the phenomenon was not to take place At the close of each experiment laparotomy was performed under general anæsthesia in order to confirm our findings Six of the 11 animals studied by this method showed unmistakable regurgitation under the fluoroscope X ray films were exposed for permanent record (Fig 1)

In conclusion it may be said briefly that the chief factor in the production of regurgitation lies in the bladder for the one indispensable requisite without which we have never been able to obtain reflux is active tone of the vesical musculature We believe that tonic contraction of the bladder wall against the distending fluid particularly in the presence of vesical neck obstruction is able to open the ureteral orifice sufficiently to permit regurgitation to occur

From the foregoing experimental work and from many clinical observations we hold the opinion that ascending renal infection must be recognized as a clinical entity and that regurgitation of infected bladder urine must be held accountable for certain clinical phenomena which we as urologists frequently witness in the care of our patients

The following clinical observation is one which we have frequently noted and I have no doubt is also familiar to all present An individual whose ureteral orifices have been previously determined to be normal by cystoscopy has a suprapubic prostatectomy per

formed The convalescence has been uneventful and the temperature has been normal The suprapubic drainage tube has been removed and just at the time when the sinus closes and before the normal act of urination has been well established there occurs a chill followed by a sudden sharp rise in temperature and the usual symptoms and signs appear which we recognize as renal infection commonly called pyelitis

In this situation under discussion there has been no change in the condition or treatment of the patient prior to this phenomenon and no new areas for absorption have been produced by instrumentation or in other ways which might make probable a blood stream infection We believe that this picture is one of ascending infection and that it can only be reasonably explained on the basis of ureteral regurgitation A case history by way of illustration might be of interest

CASE 1 S T E a doctor age 61 had had the usual progressive symptoms of prostatism for a period of 5 years Examination showed benign hypertrophy of both lateral and a small median lobe and residual urine 6 ounces clear and sterile and essentially normal by urinalysis Cystoscopy showed besides bilateral and median lobe hypertrophy a bladder capacity of 12 ounces Bladder musculature and mucosa were normal and both ureteral orifices were normal Preoperative preparation by indwelling catheters for 10 days subsequent bladder infection of mild character but without developing any febrile state Ten days drainage and the renal pre-operative treatment showed renal functions and blood chemistry to be essentially normal A one stage suprapubic prostatectomy was performed and the specimen removed in one piece proved to be benign hypertrophy After a slight rise in temperature lasting a few days the temperature continued normal The pulse was 80 and respiration 20 and the urine was acid slightly cloudy from pus and over 60 ounces in the 24 hour amount The suprapubic tube was removed on the twelfth day and no urethral drainage was established The patient voided for the first time on the twentieth day after operation although a small amount of suprapubic drainage continued until the twenty fourth day when the suprapubic wound ceased to leak This patient was instructed as is our custom to try to urinate every hour so as not to have much intravesical pressure

On the twenty fourth day after operation the day the suprapubic sinus ceased to drain the patient developed a severe chill rise of temperature to 104 degrees F and pulse to 108 and severe pain in the right kidney region There was no noticeable change

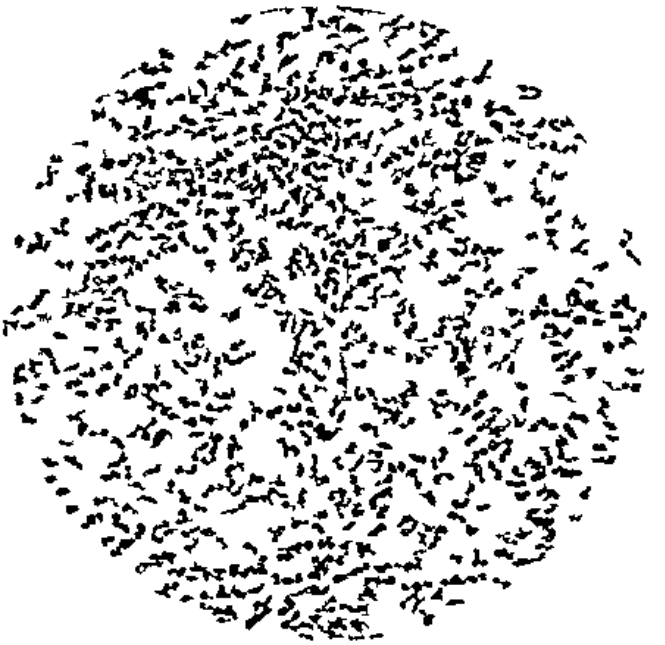


FIG 7 Acute inflammation of the kidney of diffuse type Caused by colon bacillus Note that the lesions consist of inflammatory exudate and the cellular leucocytes with considerable fibrin formation and few polymorphonuclear leucocytes The exudation is both in the tubules and between them There is no tissue solution

in the urine Catheter drainage was established the following day The patient was acutely ill with unquestionable right kidney infection Five days after the onset the temperature dropped to normal for the first time and with a gradually less active evening elevation for a total period of sixteen days stayed normal and all signs of tenderness disappeared from the right kidney region Catheter drainage and bladder irrigation four times a day were continued for twelve days after the onset of the renal infection as it is our feeling that renal infection requires free ureteral drainage and the bladder should be made passive in its activity To bring this about catheter drainage has been routine where this phenomena has occurred

This clinical picture which we have described not only occurs in the postoperative course of prostatic patients as above discussed but the regurgitation of infected urine may also take place and give rise to the same clinical phenomena during bladder drainage with an indwelling catheter which becomes temporarily blocked I believe as we refresh our recollections that we can all recall patients who have been doing well under catheter drainage who suddenly and for no apparent reason develop the familiar sequence of chill fever and pain in the region of the kidney The onset of the renal infection has been

evident enough but its manner of production has not always been so readily explained as there seems no reason that such a sequence of events should be brought about by a blood stream invasion by organisms Very often in these cases close questioning will elicit the fact that prior to the chill the patient has experienced a sense of bladder distention produced because the catheter has ceased to drain

Under these circumstances the catheter has become an obstruction to the outflow of infected urine from the bladder and has produced a tonic spasm of the bladder musculature and a consequent reflux of infected urine up the ureter to the kidney

In addition to the occurrence of ureteral reflux and renal infection under conditions which we have described regurgitation of infected urine must be considered a factor of great importance in producing renal infection even before any form of treatment is instituted and may be accepted as an explanation of renal infection associated with vesical neck obstruction in patients whose ureteral orifices appear normal by cystoscopic examination

By whatever path the kidney is infected whether through ureteral regurgitation or through the blood stream the infection varies in degree from a mild pyelitis or pyelonephritis to those more advanced conditions involving much kidney tissue and even extensive kidney destruction

That hæmatogenous infection of the kidney must be considered the most common is not questioned The differentiation from those ascending is usually difficult The absence of any vesical neck obstruction and the presence of any septic foci demonstrable anywhere in the body naturally lead to a belief that any particular instance is due to organisms gaining entrance to the blood stream and reaching the kidney by this path

The absence of positive bacterial findings in blood cultures in such cases does not preclude this avenue of invasion It is interesting to note in this connection that organisms may be recovered from the blood stream during the period of the rigor associated with the onset of the renal infection and following the rigor the organisms are absent from the blood which makes it probable that the rigor is an expression of the blood stream invasion as in some other diseases such as malaria

The renal disturbances of hæmatogenous origin may vary in their severity from a very mild to a most severe inflammatory change

In a paper before the American Association of Genito Urinary Surgeons in 1912 and in subsequent papers before the genito-urinary division of the American Medical Association and before the New York Academy of Medicine one of the authors (Cunningham) recorded five cases of acute unilateral hæmatogenous infection of the kidney of a suppurative type originally described by Brewer for which nephrectomy was performed as the only means of saving the patient's life because of the severity of the infections and the progressive toxæmia resulting from them Since that time eight other cases of this form of renal infection have been observed and treated in the same manner without any fatalities

In these same communications there was recorded another group of six patients with severe unilateral diffuse non suppurative inflammation who were operated upon because of the severity of the infection In this group nephrectomy was not always necessary Since that time there have been observed 18 patients of the same group who have required operative procedures in the form of decapsulation puncture and drainage of infected areas and in some drainage of the renal pelvis

There was also recorded in these communications a large group of patients who were borderline cases in the non suppurative group who were treated by palliative measures Of course the great majority of renal infections fall into this last group and vary greatly in the degree of kidney tissue involved and the severity of the symptoms produced

It is felt now as then that renal disturbances of hæmatogenous origin fall into these three classes

The pathology of acute inflammatory nephritis of hæmatogenous origin results from the invasion of the kidney by certain microorganisms in particular by the pyogenic cocci and the colon bacillus It is theoretically of a metastatic nature the nidus of infection often

being some suppurative process not infrequently in the form of a boil carbuncle infection of the tonsil teeth and enteritis In many instances however the nidus from which the organism gained entrance to the blood stream is undiscovered

The pathology of acute unilateral hæmatogenous infections of the kidney is quite different from the acute bilateral kidney infections The latter is an expression of a general septicæmia or pyæmia in which the kidneys may participate The former the acute unilateral kidney infections of hæmatogenous origin is not a part of general pyemia but finds its origin in the lodging of a minute embolus carrying one or several organisms in the terminal vessels of the kidney It is probable that as a rule the process is started by a single micro organism The condition starts *not* by multiple simultaneous infections throughout the kidney as the lesion observed in the kidneys removed at operation and postmortem might suggest but as a single focus in the cortex of the organ When the organisms settle in the minute capillary vessels of the glomerulus an inflammatory reaction is set up around the glomerulus and the surrounding tissue is infiltrated with the products of inflammation From the primary focus of infection other areas are secondarily involved by the infectious material gaining access to other tubules to the lymph spaces and through the vessels in the connective tissue stroma The infection thus is more or less rapidly spread through these channels to other parts of the organ

Concerning the pathology of ascending renal infection there is no such accurate picture From a practical standpoint it is probably a fact that lesions of the suppurative type rarely occur Much work has yet to be done before the pathology of ascending infection is placed on the same basis of understanding as is that of hæmatogenous origin Valuable laboratory information has already been obtained but is insufficient for definite conclusions It is a subject in which we are actively interested and will be the subject of later reports

The renal pathology produced by a blood stream infection is of two distinct types (1) *abscess formation* (2) *a diffuse inflammatory process without breaking down of tissue*

In the former type of the disease *abscess formation* the kidney is found somewhat enlarged from congestion and disseminated through its substance are small separate foci of suppuration or miliary abscesses surrounded by areas of congestion In the early stages of this disease these minute abscesses are often observed in the cortex just beneath the capsule From here other parts of the organ are secondarily involved as previously mentioned If the process continues these foci may enlarge coalesce and form abscesses of larger size which may rupture the kidney capsule invade the perirenal fat and result in a perinephritic abscess For the infection to complete this cycle the resistance of the individual must be great and the virulence of the infecting organism comparatively slight as the systemic toxæmia from this disease is often rapid and death may occur before the process develops to this stage The organisms which we have found producing this form of kidney inflammation are the pyogenic cocci the staphylococcus pyogenes albus and aureus and the streptococcus pyogenes

The *gross specimen* and histology of this fulminating form of the disease is seen in Figures 2 3 and 4

The second type of the disease and by far the more common *is a diffuse inflammatory process* spreading through the kidney substance but not resulting in focal abscesses or solution of tissue having the same sequence of development in its pathology as when of hæmatogenous origin This type of the disease presents a pathology more commonly the result of an ascending infection The difference in the severity of the process of the non suppurative type probably depends upon the lesser virulence of the infecting organisms the bacillus coli being the organism usually recovered Whether or not it was the original organism producing the inflammation may be open to debate The kidney is found to be enlarged from congestion There may be subcapsular areas of more or less acute reddening and on section the organ is found to present irregular circumscribed acutely red

tinue not unlike a beginning typhoid fever The pain tenderness and muscular rigidity may become gradually more pronounced and the temperature pulse and leucocytosis elevated or the differential sign may gradually decline Pain on the affected side may persist indefinitely and recurrences of the acute symptoms are not uncommon

An illustration of a severe form of the disease is as follows

Case 1 A woman 43 years of age had had a severe illness characterized by pain in the right side of the abdomen and back fever chills and cloudy urine and had stayed in bed several weeks Since that time she has had several similar attacks which confined her to bed for from a few days to 3 months and different physicians who were called in had considered that in the attacks she was suffering from pericystitis Sometimes the pain which the patient referred between these attacks there had been constant pain with tenderness in the left kidney region Several X ray examinations had shown nothing abnormal Four years ago the patient had had a small amount of blood in the urine during one of the attacks This occurred again 2 years ago It never lasted more than a few days

On February 2 1911 the patient was cystoscoped and a collargol injection and roentgenogram were made of the left kidney The cystoscopy showed the bladder to be normal in all respects both ureteral orifices were normal and the catheters were passed to each kidney The specimen of urine collected from the right side to be normal but that from the left contained an abundance of normal renal cells and granular epithelial cells The only organisms present were the colon bacillus The quantity of the renal pelvis was 14 cubic centimeters The roentgenogram of the injected kidney showed little to be normal

On February 14 1911 the writer again cystoscoped the patient and found the condition as previously stated An injection of 6 millimeters of phenolsulphonephthalein showed the dye to appear on the right side in 6 minutes on the left in nine minutes The total amount recovered in the urine was right 25 per cent left 10 per cent On account of the persistent pyuria an exploratory examination of the kidney was undertaken Temperature at the time of operation was 99 2 degrees Pulse 100 Urine to be 8 100 The operation was performed February 16 1911 An anterior incision was made The peritoneal cavity was opened and explored Nothing abnormal was found The peritoneum was incised and stripped to reveal the median line exposing the left kidney retroperitoneally The perirenal fat was adherent to the kidney capsule The kidney was but little larger than normal Several grayish depressed areas were seen beneath the capsule On section it showed many pale grayish cloudy areas

some near the cortex others in the pyramids The remainder of the kidney was reddish yellow and there were adhesions between the apices of the pyramids

In view of the history these areas were considered to be of long standing foci of acute inflammation It was believed that the persistent pyuria following the acute attacks was explained by the retrograde infection and the kidney was therefore removed

The surgical report was as follows The surface presented several irregular hemorrhagic areas which are depressed and contracted Some of these areas seem to be a small area of injection irregularly outlined On section several similar but smaller areas not recognized by the injection were found scattered throughout the cortex substance Near the upper pole a necrotic area 2 centimeters in diameter was found and this lies in outline containing there a white apparently ablated tissue The capsule of the kidney strips with difficulty leaving an irregular surface in places The cortex measures 6 millimeters and the glomeruli are injected The histological diagnosis acute diffuse parenchymatous inflammation of the kidney with hemorrhagic areas

It must not be inferred that it is our feeling that the majority of renal infections produce the extreme pathological processes or the severe clinical pictures which the foregoing description of pathology and illustrative cases portrays These two severe types illustrate the suppurative fulminating infection and the severe form of non suppurative diffuse inflammation and are simply illustrative of the severe grade of inflammation which may take place The milder types we feel should be interpreted as lesser grades of the same pathological process

The common inflammatory process in the kidney is seldom so extensive and the symptoms following the onset subside more rapidly assuming a more or less chronic form It is these relatively milder renal infections with which we as urologists commonly deal and which are amenable to milder measures such as forced fluids urinary antiseptics free catharsis and in the more obstinate chronic cases lavage of the renal pelvis

Finally wherever a nidus of infection can be discovered in tonsils teeth or other organs it is of primary importance to determine such a focus and destroy it a matter too often disregarded Moreover it is fundamental that whatever obstruction to free drainage has produced stasis and lowered resistance

within the urinary tract should be eradicated for without the relief of causative factors any form of treatment may be of little permanent value

CONCLUSION

Renal infections, of paramount importance to the urologist can no longer be considered as solely of hæmatogenous origin Regurgitation of the bladder contents in the presence of vesical neck obstruction has been shown to make possible an invasion of the kidney through the ureter from the lower portions of the urinary tract

The pathological processes produced by renal infections ascending or hæmic may be in all gradations from simple to most diffuse and even suppurative forms

Treatment as always must be measured in terms of the disease and varies from radical surgical intervention to the mildest therapeutic measures

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ERECT DISLOCATION OF THE SHOULDER

Review of the Literature and Recorded Cases with The Report of Three Cases

By FRANK S LYNN M D F A C S Baltimore Maryland
From the Surgical Clinic of the University of Maryland

WHEN the frequency of dislocations of the shoulder is considered and the number of erect dislocations of this joint reviewed by comparison the number of the latter is indeed small and the incidence rare

In some of the largest surgical clinics no cases are recorded Kronlein reports 3 cases in 207 dislocations of the shoulder In 400 dislocations Bardenheuer met with no case At St Thomas London in 539 shoulder dislocations no case is recorded (Makins) Treves speaks of it as a most rare condition

This dislocation is a variety of subglenoid dislocation and was first called attention to by Middledorpf in 1859 At that time he reported two cases and had the advantage of necropsy on one His work was further supplemented by experiments on cadavers by his assistant Scharm To these men therefore belongs the credit not only of first directing the attention of the profession to this dislocation but also of first giving us the pathology From that time up to the present the writer has been able to collect 31 cases including the 3 making the subject of this report

In the anatomical consideration of the shoulder joint those factors favorable to displacement are (1) shallowness of glenoid cavity (2) the relatively large size of the humeral head only one third of head being in contact with glenoid when the arm is at the side of the body (3) the thinness and great laxity of the capsule (4) the maintenance of the contact between the articular surfaces by muscular action together with atmospheric pressure and not by ligamentous or capsular attachment and (5) the length of the humerus which affords a long leverage and the exposed position of the shoulder joint

The foregoing conditions favor dislocation and render this joint more frequently the subject of this accident than any other joint in the body The usual position in which luxation occurs is that of abduction and the advancement of the arm as in falls on the hand This attitude brings the most prominent part of the lower edge of the head of the bone against the thinnest and weakest part of the capsule Moreover the greatest diameter of the head of the humerus is involved adding to the pressure against the capsule As such accidents happen suddenly the muscles are taken off their guard and hence that source of protection to the joint is lacking

Those factors unfavorable to dislocation are (1) the exceptional relation of biceps tendon to the joint strengthening the capsule

at its upper portion (2) the arrangement of glenoid cup the inner and lower edges of which are more prominent than the outer and upper (3) the deepening of the glenoid cavity by the glenoid ligament and (4) the resistance offered by the strong coraco acromial ligament to any upward displacement

ETIOLOGY

The ages of the patients range from 21 to 60 years If the patient is above 60 there is usually a fracture because of the brittleness of bone and if younger than 20 an epiphyseal separation rather than a dislocation For the actual production of the luxation violent force is not necessary but when it occurs the arm is usually abducted or extended and the forearm pronated

Direct or violent force applied to the shoulder from above has been the determining factor in two cases (Maurel)

The part played by the structure of the shoulder joint is interesting in revealing the pathology and is one of the chief signs The shoulder joint is protected on all sides by bony and muscular structure except at its lower boundary which is weakest The glenoid cavity is arched above by the acromian process in front externally and behind by heavy muscles but there is nothing below to support the head of the bone and it is easy to see why the rent occurs in this part of the capsule

PATHOLOGY

The work done at autopsy on the few cases that succumbed has been supplemented by work in the dissecting room The head is always found against the side of the chest there is a separation of the capsule from the humerus in its upper part with the supraspinatous and infraspinatus muscles torn away At times there has been a partial rupture of the subscapularis and pectoralis major Injury to the axillary vessels while it might be expected has not occurred to any serious degree Nerve injury however has been more serious and permanent

SYMPTOMS

There are three cardinal symptoms seen in this dislocation (1) elevation of the arm (2) fixation in this position and (3) pain increased by any attempt to lower it The forearm is usually flexed and resting on the top of the head The fixation of the arm in this position is explained by the tenseness of the anterior and posterior parts of the capsule i e the part in front of and behind the rent through which the head passes The long head of the triceps also retains the head of the bone in this position

CASE REPORTS

It has been possible to collect 28 cases in the literature Hulke in Holmes and Hulke s *Surgery* mentioned two cases coming under his observation at King s College Hospital but no details are given

Bardenheuer in his work on Injuries of the Upper Extremity speaks of Bertin having a case and of Meyer having two Here details are lacking

Stimson (1915) mentions 3 cases admitted to the Hudson Street Hospital one of which was seen by Stimson He remarks that it is probable that no one surgeon has seen more than one case

The following cases have been reported in the literature To these are added the 3 cases which make the subject of this report here with published for the first time

CASE 1 Middledorpf (1859) F B driver age 57 applied for treatment June 10 1857 While working in a hay loft a plank gave way and he fell to the floor below His arms were forced above his head He tried to hold on to the planks but plunged heavily downward When he landed on the floor below he found he could not lower the left arm He entered the hospital with an expression of great pain and his left forearm resting on his head The deltoid muscle was loosely drawn together Under the middle of the lower margin of the pectoralis major and below the glenoid cavity was the humeral head Without anæsthesia several unsuccessful attempts were made when finally it was reduced by extension in the line of deformity and then gradually describing an arc with the elbow directed upward and outward and then downward at the same time pressure from below on the head On June 30 the patient was discharged without any untoward symptoms

CASE Middledorpf (1859) T S laborer age 27 years March 30 1858 was winding a load of 4 400 pounds with a windlass to an upper floor The locking device broke the handle turned back and drove the arm in the opposite direction violently upward and struck the humerus near the joint as it

came downward The man when brought in was in extreme shock The right shoulder appeared as if the humerus was broken the bone projected upward the elbow a little higher than the top of the head The deltoid contained an extensive wound which became infected and the patient died This case came to autopsy The capsule was stripped off the greater tuberosity was broken and hanging to the supraspinatus muscle and all muscle insertions were torn off except the pectoralis major and lati simus dorsi

CASE 3 Busch (1863) X Y porter age not given The patient was going down the cellar steps carrying a heavy sack on left shoulder In the dark he stumbled and fell He at once experienced great pain in the left shoul der and when he arrived for treatment the left arm was lifted the left elbow was bent and the forearm was resting on the head the right hand supporting the left The head of the arm was resting in the arm pit Several times the patient tried to pull the injured member down to his side but the pain was so severe that he did not succeed and it would each time resume the position given above Finally the operator placed the patient on the ground with the head bent a little to the right in order that the arm could be bent a little toward the right away from the erect position With a slight pull upward the arm was replaced

CASE 4 Lange (1879) A male age 45 was rolling ice The arm was extended at an angle of 120 degrees with hand in supination After reduction the patient went to work in 3 weeks

CASE 5 Alberti (1884) W G driver age 32 on April 4 1833 as he tried to hold down a rearing horse by the reins was carried up in the air with the arms lifted When the horse came down to the ground it knocked him with its front foot and threw him to the ground He at once felt pain in the left shoulder and could not bring his left arm down On examination the left arm stood almost vertical The forearm was flexed at right angles and the hand rested on the head The glenoid cavity could be easily felt The deltoid muscle showed two deep indentations The head of the humerus was just a little posterior to the mid axillary line Under anæsthesia by extension the head of the bone was pulled into the glenoid fossa and a Desault bandage applied As the patient did not return after leaving the hospital the ultimate result could not be ascertained

CASE 6 Hansson (1892) P S N S age 41 female on night of August 26 1890 was bending forward leaning against the door frame with right arm above the head She slipped and almost fell on her face She felt pain in the right shoulder The right humerus was in the erect position the elbow on a level with the forehead and the arm at an angle of 170 degrees with axillary line The forearm was horizontal There was a large swelling in the axilla Pas ive movement was very painful and limited The accident had occurred 7 hours before the patient sought aid Because of this and the fact that she was pregnant and had a goiter she was very weak Attempt at reduction without anæsthesia was not successful With chloroform the arm was pulled up and circumducted outward toward the midline of the body at the same time exercising pressure from below The head of the bone slipped into normal position and the arm could be moved in all direc tions The arm was not immobilized Three weeks later there was some paralysis Massage was used In April 1891 paralysis had disappeared and the patient could do ordinary duties

CASE 7 Judd (1895) A man age 32 in April 1895 fell on the office floor with outstretched left hand Without anæsthesia reduction was accom plished and in six weeks recovery was perfect

CASE 8 Margarey (1895) Female Left shoul der Accident caused by patient wrestling with her husband The hand extended above her head Reduction was accomplished by extension with heel in the axilla

CASE 9 Scheller (1896) A private soldier was carrying his bed on his right shoulder and had his arm lifted upward in order to keep the bed in position In thi way the head of the humerus became dislocated The right arm was extended and immovable The deltoid muscle was slack and could be pressed down easily The head of the humerus could be easily felt The patient stated that on several occasions he had suffered disloca tions of the shoulder Reduction was accomplished by strong extension in axis of the arm without any anæsthesia

CASE 10 MacDonald (1903) A middle aged man holding the reins of a scared horse fell The picture was classical Reduction was done under anæsthesia

CASE 11 Osenbach (1904) K F male age 24 fell from scaffold and in falling extended the left arm which was struck by a piece of timber This produced a subglenoid dislocation and because of retaining his hold as he fell he simply pulled his arm upward reversing the long axis of the humerus and producing a luxatio erecta It was reduced by extension and immobilized The patient returned to work in 10 days

CASE 12 Vaughan (1904) A man age 66 years was admitted to the hospital October 4 1903 after a carriage accident The elbow was in 45 degrees abduction the forearm was flexed Reduction was accomplished without anæsthesia One month later the result was good save for wrist drop

CASE 14 Montgomery (1905) A man age 64 September 1904 fell and in an attempt to save himself stuck out the right hand Reduction with ether was accomplished 2 days later Ten week later there was wasting of the deltoid and no power to grip Extension of the fingers was almost nil Pronation was fair Supination was restricted Of interest in this case is the brachial plexus injury

CASE 15 Edson (1908) N J male age 42 while hastening to catch a trolley car slipped and fell and sustained a fracture of the neck of the femur

and upward dislocation of the shoulder Reduction was made under chloroform The patient had free use of his arm

Case 16 Gregoire (Pratt) 1909 A man 35 years of age a painter fell from the top of his ladder and lighted on his shoulder The left arm was in the characteristic position There was pain on attempt to lower the arm Roentgenographic examination confirmed the clinical picture and diagnosis Reduction was easy

Case 17 Preston (1910) The patient was struck by a train and the method of production was difficult to ascertain Reduction was accomplished by extension and pressure on head of bone The patient died in 2 days because of other injuries

Case 18 Falkner (1916) An elderly farmer walking along the railroad fell in a fit dislocating the shoulder When first seen the day after the injury the patient had an ordinary subcoracoid dislocation with considerable ecchymosis in the axilla Under chloroform he was unable to reduce the dislocation A companion of the patient ventured the information that when the accident first happened the arm was extended over the head and he had great difficulty in getting it down Under the anesthesia a careful attempt at reduction could not be accomplished by usual methods The head of the bone was on the edge of the glenoid cavity The arm was then fully extended back of the head into the position that it was immediately following the injury Traction was made upward and and rather forward with counterpressure on the head of the humerus which was plainly felt in the axilla and the dislocation was reduced Falkner believes that have been case of luxatio erecta

Case 19 Turner (Maurel) 1919 A butcher in falling, slow the steps got his arm above his head and was afterward found to have an erect dislocation The detail of this case are very limited

Case 20 Maurard (1920) This is the only case of double luxatio erecta thus far recorded The patient was a man 30 years old and a station pilot He was sent to the hospital June 11 1920 The mishap fell to the ground shortly after starting On admission to the hospital the patient was in great pain The arms were raised on each side of the head in a position representing a prophet in prayer The arms had a tendency to fall back and which provoked a great amount of pain The position was symmetrical but pain was greater on the left side On the right side color was normal but the pulse could not be felt At the bottom of the armpit there was a round hard projection which was the humeral head Passive motion of the arm brought about great pain On the left side identical but under the arm pit there was a clot and it was impossible to move the fingers or the limb X ray examination confirmed the diagnosis The general condition of the patient was bad he was badly shocked Reduction was made with a small amount of ethylchlorid The patient died an hour after reduction Autopsy Right shoulder The capsule at its lower part contains a rupture In placing the limb back in the position of dislocation the head of the bone is exposed and the articular surface is lying forward and the vessels and nerves are lifted up in the same way as the reins of a to horse The vessels and nerves are intact Left shoulder In accentuating the motion of the left arm the head goes entirely out of the capsule The tuberosity of the humerus is found to be fractured The muscles over and under the scapula are fully detached On the left side the lesion are exactly the same

I would report the following cases

Case 21 (1914) H R male age 62 years entered the hospital complaining of an injured shoulder The injury was sustained at the factory in a fall over a truck when the right arm and shoulder were twisted The following note was made on admission Pain is excruciating and no movement is permitted Patient says he cannot move arm to side and that this is the first time he has had any severe sickness or injury He felt perfectly well until injury was sustained On entrance patient seems in great pain and discomfort Right arm is held up at an obtuse angle from body (Fig 1)[1] with forearm extended Movement produces great pain There is considerable deformity and quite a fold at the normal position of head of humerus the head being below and anterior to the glenoid cavity No crepitus is elicited Examination is otherwise negative

Impression Subglenoid dislocation of the humerus of the erect type The X ray shows a marked subglenoid dislocation with no fracture Without either reduction was attempted but was unsuccessful Under ether anæsthesia the dislocation was reduced by traction upward and the arm was immobilized with crinoline bandage

Nine years after the injury the patient is well and has very good use of right shoulder There is no nerve injury Motions are good in all directions He has had no further trouble in this shoulder

Case 22 (1921) S I male age 21 years was in a motor cycle accident a short time before admission When he came in his right upper extremity was projecting upward parallel with the side of the head There was a moderate amount of pain but any attempt to bring the arm down greatly increased the pain The head of the humerus could be felt below the glenoid cavity The X ray confirmed the diagnosis of subglenoid (erect) dislocation of the shoulder (Fig 2) Without an anesthetic by slow gradual traction upward the head was felt to slip in the glenoid cavity and the patient was able to move the shoulder joint The member was immobilized for 2 weeks and the patients recovery was complete with no nerve injury

Case 23 (1924) I R male age 28 years While playing baseball and running for bases tripped and

[1] The original of this X ray bow by Bacon and Wilson in the work Bones and Joints



Fig. 1. H. K. Jan. 9, 1914. Male, age 62.



Fig. 2. S. I. Feb. 4, 1921. Male, age 21.

shoulder with right upper extremity projecting forward and abducted. He suddenly experienced pain in right shoulder and when picked up was unable to lower right arm to side of chest. When I saw him the right arm extended upward parallel with side of neck and head, the right forearm was flexed at elbow and the hand was supported by the left. Any attempt to lower the right upper extremity increased the pain. The head of the humerus was found below the glenoid cavity. The case was at once recognized as an erect dislocation of the shoulder. Under brief gas anæsthesia by upward traction of the right arm and forearm and with an assistant pressing on head of humerus in axillary space the dislocation was easily reduced. Subsequent X-ray examinations showed a slight tearing away of greater tuberosity of the humerus. At the present time patient is still wearing an immobilization dressing because of the complicating fracture.

CONCLUSIONS

Violent force is not always necessary to produce this form of dislocation. The position of the arm in a large measure influences its occurrence. There is considerable damage to the capsular ligament and to the muscles attached to the upper end of the humerus in all cases. Occasionally we meet with nerve injuries. Reduction by upward traction of the arm has been easy in the majority of cases. Reduction by the ordinary means has usually been unsuccessful. Naturally the occurrence is more common in males. Between the right and left shoulder the number is about evenly divided. There is only one recorded bilateral case, that of Murard (1920).

The writer feels that the rarity of the condition justifies the reporting of these cases.

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FRACTURE OF THE MIDDLE THIRD OF THE CLAVICLE

By DR FABIO STOCCADA Padua Italy
[illegible]

ALL writers agree that fractures of the middle third of the clavicle are rarer than those of the intermediary third or the junction of the middle and outer thirds Of the 134 cases of fracture reported by Hamilton only four involved the middle segment Gurlt quoted by Ricard in 221 cases found only 6 fractures of the middle third Whereas Delens met with 8 cases of fracture of the middle third and collected 20 others from various writings I have been unable to trace any systematic work on the subject and have found only brief mention of the subject in treatises on surgical pathology or in monographs devoted to fractures I do not know whether this is due to the rarity of such cases to the fact that many such cases do not come within the range of hospital statistics or to the scant importance attached to these fractures by modern writers Neither Garre and Borchard (third edition 1921) nor de Quervain (sixth edition 1919) mention this important phase of traumatology

I will refer briefly to two cases of fracture of the middle third of the clavicle which I have recently had occasion to observe in the male surgical division of the Civil Hospital in Padua The first was an almost complete fracture in a child of 6 years which came under our observation about 20 days after the lesion The second was a complete fracture in a man of 72 years

CASE 1 A boy age 6 on April 2 1923 while playing in the courtyard fell striking the top of the right shoulder against the ground After crying for a few minutes he went on playing moving the upper right joint as if nothing had happened A few days later the mother noticed that although the child did not complain of any inconvenience he nevertheless held the tip of the right shoulder slightly lowered Twenty days after the fall without further lesion or exertion while playing the child complained of pain in the vicinity of the middle third of the right clavicle and it was only then that the mother noticed a swelling On the same day the patient was brought to our section to be examined

Hereditary negative no previous fracture the child appears healthy cranium rather large in proportion to age Thorax and abdomen negative The right clavicle in its medial part (fig 1) shows a fusiform tumefaction the size of a pigeon's egg This swelling was practically close to the sternoclavicular articulation becoming gradually smaller toward the lateral segment of the bone which was normal in aspect The tip of the right shoulder was on the same level as that of the left but protruded slightly forward The skin covering the tumefaction was of normal color and appearance and moved perfectly over the osseous surface beneath There was no trace of progressive ecchymosis or of vein tracery No circulatory or nervous changes were encountered in the right shoulder joint the active and passive movements of which were normal The movement of the head was also free The measurement of the bone from the two articular space lines (sternoclavicular and acromioclavicular) showed on the right a shortening of about 1 centimeter On handling a mass of bony substance uniformly compact smooth without the least trace of channelling was felt The point of the finger when inserted in the sternoclavicular articular space penetrated slightly a sure sign of a slight diastasis of the two joint heads Active and passive movements of the clavicle were accompanied by movement of the intumescence When we placed the hand on the line of the fracture after getting the patient to move his right joint up and down we did not notice any unnatural crepitation or mobility But mobility was noticeable though it was hard to detect when we took hold of the bony heads with the fingers on either side of the line of fracture and moved the heads backward and forward Pressure exerted along the main axis of the clavicle caused no pain except when the fingers passed over the swollen part The tuberculin test was negative We did not think fit to apply the Wassermann reaction The roentgenographic examination made 33 days after the lesion by Dr P Pero showed the following

In the middle part of the middle third of the right clavicle (Fig 2) or just outside the appendage of the clavicular rib ligament is a line of fracture visible especially toward the lower margin of the clavicle itself This line a little oblique at the axis of the bone running from top to bottom and from the inside toward the outside follows exactly the direction of the upper margin of the third rib below and is partly merged with it The two extremities of the projection from front to back appear as coinciding and in the same direction as the axis of the clavicle Further around the point of fracture can be seen a very minute halo scarcely recognizable when confronted with the homologous part and constituting the bony callus (the *callo fibroso* of the French writer) The diameter of the two extrem

ities appears slightly increased Roentgenologically it is also seen that the sternal extremity of the clavicle slightly lowered is a little detached from the incisuræ claviculares of the sternum

An oblique projection as advised by Matti was not made as no dislocation was suspected and be cause the line of the fracture was somewhat lateral ized On the negative the callus clearly appeared while the line of fracture was less evident in the posi tive on the other hand the line of fracture strikes the eye clearly but the callus is almost invisible

Operation was advi ed to remove the callus and carry out suture of the ends and also to complete the clinical diagnosis so as to avoid the possibility of a neoplastic process On May 18 48 days after the lesion an operation was performed by Professor Vighani Ether anæsthesia was used An incision of about 10 centimeters was made parallel to the axis of the bone in the soft tissues of the region and the middle third of the clavicle was exposed At the point which corresponds above with the clavic ular binding of the sternocleidomastoid a line of fracture penetrated into the thickness of the bone leaving only a very small part unaffected the periosteum of the posterior face was untouched The point of fracture was convex and pointing for ward the periosteum of the anterior face was com pletely interrupted laterally it was considerably torn away the jagged edges of the ends of the frac tured bone were partly locked together and all around was an osteoid tissue partly calcified In order to gain a better view of the focus of fracture an incision was made upward in the tendon attach ing fibers of the sternocleidomastoid and downward in those of the great pectoral muscle In this way the posterior face of the clavicle was freed and kept up by passing beneath it first a stout pad of gauze and then an isolator of periosteum curved and fairly wide After isolating by means of small pads the periosteum of each of the two ends a cone of bone was removed together with the callus After the two ends had been aligned the osteosynthesis was performed with an aluminum coated bronze wire The wound was closed in layers and healed by first intention The course was apyretic The child was discharged on May 27 with immobilizing apparatus to keep the arm in abduction

In the examination 20 days after the lesion with the sole aid of the roentgenograph we had formed an approximate diagnosis Clinically there existed signs of a fracture (unnatural mobility of the ends) but we had to ask ourselves whether all that could be seen and felt around the line of fracture was due (1) to exuberant callus or contrary to all probabil ity (2) to a tumor of the clavicle with spontaneous fracture (medullary or periosteal sarcoma) or wheth er lastly (3) to a neoformation implanted on the callus of fracture This could be determined only by the X rays or by an exploratory incision

From the anamnesis we had to exclude not only the direct lesion but also in all probabil

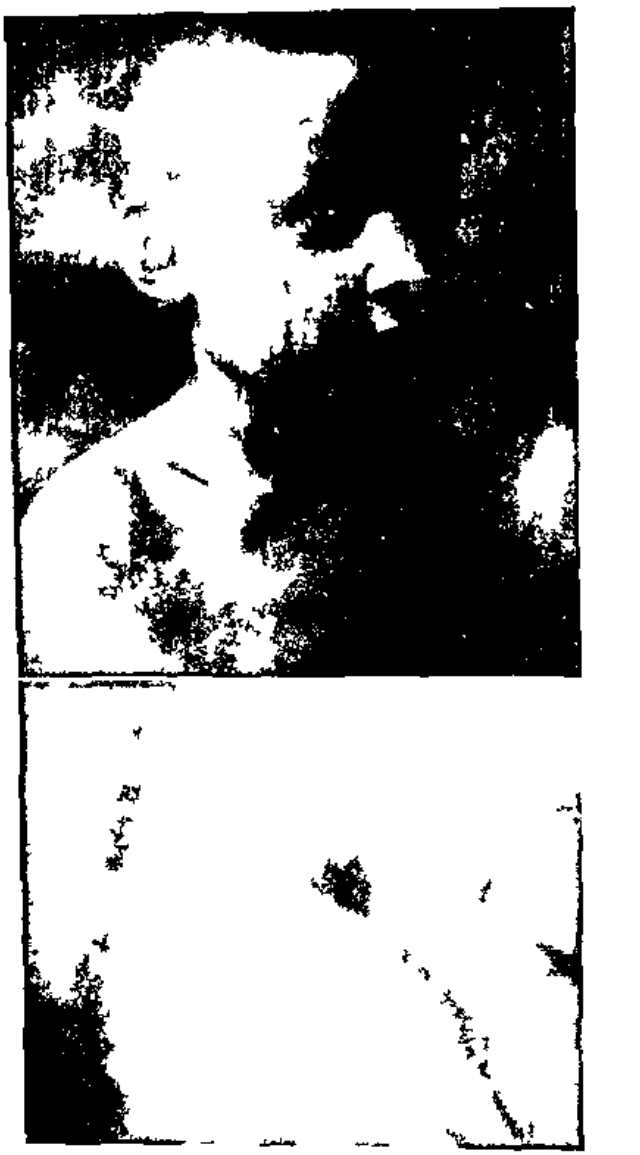


Fig (abo e) Cas 1 The right cla cle showi g a fus form swell ng the e of a pig on s egg

F g Ca e 1 Roentge ogr m showi g the li e of f actu e sible e p cially toward the low ma gin f the cla icl

ity a fracture by muscular traction Apart from the fact that in children the muscles are not very strong the line of discontinuity in the said fractures by traction should be turned upward rather than forward In the child the middle third of the clavicle flat tened from front to rear presents for con sideration an anterior face and an upper mar gin to which the sternomastoid muscle is attached

All surgeons do not agree as to which mus cles may determine by traction the fracture of the clavicle in its middle third



Fig. 3 (left). Case of fracture of the inner third of right clavicle with the fragments overlapping the terminal portion of the latter.

Fig. 4. Case of fracture of the inner third of right clavicle enlarged especially at the point of fracture.

According to the opinion of Delens recently of Eisendrath and many others the only muscle to which the fracture of the middle third of the clavicle may be ascribed is the sternomastoid. On the other hand according to an accurate study made by Pollaillon (quoted by Keith and MacKenzie) in no case does the fracture appear to have been produced by the sternomastoid muscle and the only muscles which can determine it are the deltoid and the clavicular portion of the great pectoral. A grave blow has also been dealt by Pfanner to another mechanism thought out especially by German authors to explain the fracture of the middle third of the clavicle. I refer to the so called Hipomochlion fracture. Apart from the fact that in my case the line of fracture ought to be turned upward (this because to bring about the fracture the clavicle must be forced violently onto the first rib and the pressure must be exerted from top to bottom) Pfanner asserts that even when this condition is verified a fracture of the clavicle in all probability would not ensue but rather a dislocation of the breast clavicle joint either upward or forward. These three modes of fracture being thus excluded principally on account of the anamnesis and the reasons mentioned it only remained to consider the indirect blow indicated by the anamnesis. In fact the child in falling struck the tip of the shoulder on the ground. Also the diastasis of the joint head was noted clinically and demonstrated roentgenographically. This was the result doubtless of the force exerted on the sternoclavicular articulation. In the study of the focus of fracture we must above all take into account the lack of adhesion of the ends 46 days after the lesion. Ollier has shown that the constant mobility of a fracture even when exerted within narrow limits prevents the ossification of the tissues of the callus so that this remains in the fibrous state. In our case after the lesion the ends had not been fixed in a retention apparatus and despite the fact that the bone on its rear face had not been injured in its continuity the movements made by the child when playing might have been sufficient to prevent the fusion of the ends thus explaining the persistence of the line of fracture at such a remarkable distance from the lesion.

In explaining the exuberant callus we could readily eliminate displacement of the ends large hematoma fracture combined with violent contusion of the soft parts and the irritating action of massage (Matti and Lexer). The exuberant callus in our case must have resulted from the irritation produced by the movements of the joint and from the remarkable separation of the periosteum noted on

the operating table The general rule which proves that the smoother the surface of a bone the less the periosteum adheres to it may be applied also to the clavicle in which according to Pier ol at the same age the ad hesion of the periosteum to the bone is con siderably less than the adhesion of other parts of the bone structure Finally we must take into account the periosteal density associated with precocious ossification As a matter of fact the clavicle is the first organ of the bone structure to become ossified after the first month of fetal life and the ossification devel ops rapidly (Chiarugi) In conclusion in our opinion the cause of the exuberant callus was to be found in the special structure of the periosteum *and in its relations to the bone* Nor can we exclude the fact that the forma tion of such a callus might have been related to the signs of rickets noted in the patient as the excessive size of the head in proportion to the age According to Ombredanne the perios teum of children with rickets i still thicker and adheres still less than in the case of nor mal children

Further the structure of the exuberant callus cannot be dissociated from the mecha nism of cure of fractures As regards this point there are two conflicting theories According to Bonome the callus is formed of trabeculæ at first osteoid which subsequently become o seous mature and calcified After the eighth or ninth week the callus solidifies by the absorption of calcareous salts subsequently the so called involution takes place the trabec ulæ become smaller and the callus more com pact and solid The second theory launched by Wolff has found a strenuous defender in Italy in Dalla Vedova of Rome Accord ing to Wolff s ideas in the cure of fractures there are two di tinct processes which have nothing in common At the beginning there i a reactive process or fusion which forms the car known as a callus This is formed of bony porous ti sue which sub equently en tirely disappears to be replaced by normal bony ti sue If I were asked by the formu lators of the law of tran formation according to Wolff whether in my case the callus was a product of reaction or of transformation I hould not be able to reply with certainty I believe however that we were in the presence of the so called product of reaction and I regret not having made a histological exam ination of the fragments of bone removed In our research work we should always bear in mind the warning of Van Gehuchtem that with man the experimental method is always more lengthy and laborious because we have to wait until nature produces the desired lesion produces it within the limits required and produces it and nothing else and this is only to be found in extremely rare cases

TREATMENT

I shall certainly not enumerate the 85 methods collected up to 19 1 by Bela V Mezo all *of which are called treatment of* fractures of the clavicle because for the most part they deal with fractures at the typical spot i e the intermediary third Our opera tion had for its object both diagnosis and cure We desired to establish the true nature of the intumescence and to proceed accordingly to remove the exuberant callus or to suppress the clavicle immediately should we find ourselves in the presence of a real tumor Surgical ac tion to correct the position of fragments in the fracture of the clavicle is of fairly *ancient* origin and defended by Dalla Croce dates back more than three centuries

In his compendium of Italian surgery Gior dano quotes Dalla Croce a propos of the frac ture of the clavicle *Concerning the* prog nosis it should be known that the cure of such a fracture is in the opinion of all men diffi cult And it need an ingenious and skilled man Since it is usual in these fractures for the *bone to splinter* setting up a painful and persistent pang it is necessary to cut so that the bone may be freed of pieces and splinters but *with great care* however so that the fleshy parts of the breast may not be injured Giordano is likewise of the opinion that im mediate action is necessary in subcutaneous fractures of the clavicle He exposes the focus in order to suture the two bony ends In our case we deemed it sufficient to remove the callus following thi up with simple metallic suture without complicating it by the method very recently advocated by Hinze which con sists of wrapping each bony end spirally and

then passing the wire by the subperiosteal route underneath the first rib or in exceptional cases underneath the second in order to prevent the ends reassuming the angular position

We saw our patient again 3 months after the operation and are convinced that we attained our object both anatomically and functionally thus confirming the principle of Catterina that the ideal cure for all subcutaneous fractures of the clavicle is the surgical one which results in perfect reduction and retention

Case 2 A man age 7 mason of Piazzola gave negative family history In 1918 he suffered for about 8 months from acute articular rheumatism from which he was completely cured after thermal treatment (Abano) On July 23 1923 while he was working on the paving of a room he put his foot on one of the flagstones which gave way and caused him to fall to the ground from a height of about two and a half meters striking the right shoulder tip on the ground He was admitted to our section 2 days later He had not suffered from previous fractures nor from rickets

He appears healthy but slightly kyphotic There are impurities of the tones of the heart and enlargement of the cardiac area also bronchial catarrh mixed with pulmonary emphysema An inspection of the region affected by the lesion reveals (Fig 3) a tumefaction coinciding with the right sternoclavicular articulation There is no trace of ecchymosis The end detached from the clavicle protrudes slightly under the skin The right shoulder is somewhat higher than the left and appears nearer to the middle line The right clavicle seems to point obliquely from front to back toward the outside and downward The approximation of the tip of the right shoulder is still more evident when the patient is observed from behind The head is maintained on the middle line On turning the head toward the right the patient feels more pain than when he turns it to the left The corresponding joint is in normal position Raising the right arm also occasions pain though the patient is able with some difficulty to place the right hand on the top of his head The left clavicle measures 19 centimeters in length the right 15 On probing the sternal extremity of the right clavicle is felt to be in position the articular space is probed with the nail which penetrates while the lateral is lowered the ends appear parallel the proximal above the detached below The entire supraclavicular region is painful Pressure exerted along the major axis of the bone does not occasion much pain The exploration of the clavicle from the outside inward with the two hands respectively bone and below causes pain in the hollow area There is no trace of vascular or nervous lesion in the right m

The roentgenological examination (Fig 4) reveals the following The clavicle presents a complete fracture in its middle third The line of fracture is rather irregular and jagged especially toward the lateral head which also shows for a length of about 1 centimeter a fissure parallel to the major axis of the bone dividing it almost in half The lateral end points distinctly inward and downward so as to leave the medial end completely visible this latter being in position while its shadow may escape notice as it merges a little with the posterior shadow of a rib The medial end shows a direction symmetrical with that of the corresponding part on the other side

The fracture was reduced and the shoulder fixed in a retention apparatus

It is truly stated in all treatises that the function of the clavicle is to keep the shoulder away from the trunk (the flying buttress of the French authors) Therefore when the clavicle is fractured the shoulder approaches the trunk and since the clavicle resists the fall of the shoulder drops downward and forward It should be remarked that this is true only for fractures of the intermediary third On the other hand as can be clearly seen in the roentgenogram in fractures of the middle third when the lateral end penetrates underneath the medial the shoulder is accordingly forced upward while protruding forward and nearer to the middle line

A case of complete fracture from an indirect cause as the first case makes an interesting study as to the displacement of the ends With regard to this the opinions of authors are somewhat divergent Tillmanns is of the opinion that either dislocation is completely absent or that the external fragment is forced up by the weight of the shoulder only when the muscular insertions are torn away and the costoclavicular ligament lacerated

According to Eden a marked displacement of the extremities of fractures is not generally found because the costoclavicular ligament and the sternomastoid muscle almost balance each other in their action Forgue refers to two anatomical exhibits seen in the Dupuytren museum in which the external fragment protruded downward and forward under the sternal fork Tanton is of the opinion that the external end is carried forward and downward while the internal fragment is drawn up by the sternomastoid this displacement repro

duces that of the third intermediary Koenig believes that displacement may be entirely absent or the internal fragment may remain in position while the external is carried forward and upward Occhini and Catterina think that displacement exists only when there is laceration of the posterior intraclavicular ligament Rose Carless and Matti consider that the displacement varies with the line of fracture when oblique the lateral fragment is carried down and forward This is also the opinion of Malgaigne (quoted by Ricard)

In conclusion if we admit the integrity of the costoclavicular ligament I think that the medial fragment as was observed by us remains completely in position and that in the event of the line of fracture being external to it the lateral fragment would be carried forward and downward

In this second case we did not think fit to operate not so much on account of the age of the patient as on account of his general condition We therefore limited ourselves to reducing the fracture and fixing it in a retention apparatus We ought always to consider the possibility of a sternoclavicular arthritis even if the rim of the fracture has not penetrated into the articulation We should consider the predisposition of the patient to such a diseased condition and also the repercussion suffered by the joint at the moment of the lesion It may be that this arthritic process may greatly limit the function of the joint

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INTRA-ABDOMINAL BILIARY EXCLUSION FROM THE INTESTINES—CHOLECYST-NEPHROSTOMY A NEW METHOD

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SINCE 1844 when Schwann made use of an external fistula for studying bile many method for similar purpose have been devised Each of these has had some particular drawback which has led to the devising of still other means for the exclusion of bile from the intestine

The physiology of the bile and its relation to the various metabolic functions of the body has recently acquired renewed interest because of the work of Hooper and Whipple Rous and McMaster and others In attempting to study the important question as to whether or not bile is essential to life the physiologist has been confronted with the difficulty of finding some method that would not require too great inconvenience in the dressings of the fistula and would not need elaborate collecting apparatus Lastly and most important of all the possibility of infection of the biliary passages has always been present

The simple external biliary fistula first made use of by Bidder and Schmidt (1) is one which at most can be used only for a very short period because of the severe infection produced The animals must be dressed daily the fistula must be frequently dilated as Hooper and Whipple (6) described and unless the dogs are strapped up all the time they will lick off a certain amount of bile The role that the imbibition of this small amount of bile may play is not yet ascertained with surety

Dastre (2) described a method in which he kept a tube in the fistula for more than a year collecting the bile in a bag suspended at the neck However no references could be found of any other investigator who had made use of this method

Pawlow (3) transplanted to the skin a flap of the duodenum containing the ampulla of Vater Mann (7) has recently described a two stage operation whereby the duodenum containing the common duct is transplanted through an abdominal incision into the subcutaneous layers and the duct later directly connected to the body surface All of these methods have practically the same objectionable feature as the common biliary fistula

Rous and McMaster (4) have made use of another method A long tube is attached to a cannula inserted into the common duct The gall bladder is excluded from the biliary system by ligation of the cystic duct and the bile collected daily in a sterile balloon They suggest that this method can be utilized for the collection of bile during months certainly and probably during years But in spite of this they state that their dogs sooner or later became infected However when an investigation involves the determination of the biliary output these methods are necessary They are essentially extra abdominal

Pearce and Eisenbrey (5) have suggested a *different type of approach* After removing the right kidney they anastomosed the common duct to the right ureter In this way bile was diverted through the urinary tract Several successful operations were reported but the fact was emphasized that the operation was difficult and the danger of rupture of the anastomosis or cicatricial obstruction great

The method described in this paper does not allow for direct studies of the biliary output but provides a means whereby bile may be excluded from the intestinal tract for a long period of time without incurring any of the difficulties mentioned previously

METHOD

The principles involved are (1) the anastomosis of the gall bladder to the pelvis of the right kidney and (2) the ligation and division of the common duct Both procedures can be performed at once or in separate

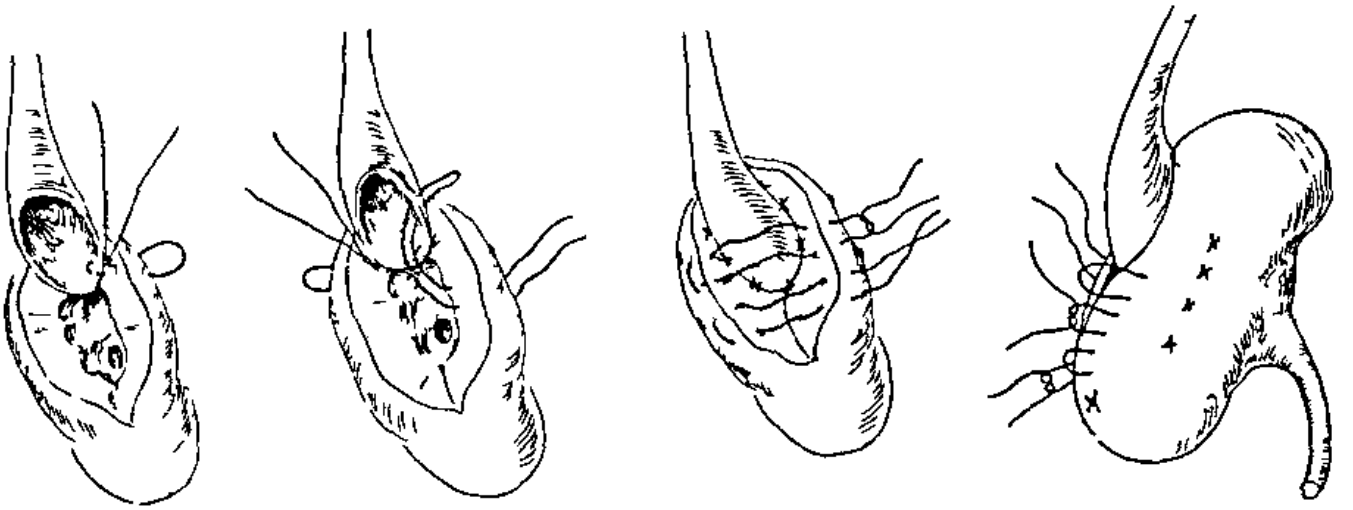


Fig 1 Fig 2 Fig 3 Fig 4

Figs 2 3 and 4 Diagrams showing suture of gall bladder to kidney pelvis

stages as one sees fit We have used both methods The operation is performed as follows

First stage The animal is prepared in the usual manner A right rectus incision is made from the costal margin to the umbilicus through which the gall bladder is easily exposed A clamp is placed upon the fundus and the gall bladder then stripped away from the liver up to about 1 centimeter from the junction of the cystic with the hepatic duct

The right kidney is then freed from its bed transperitoneally and the pedicle exposed A long curved intestinal clamp with its blades protected by rubber tubing is applied to the pedicle just tightly enough to prevent excessive bleeding when the kidney is incised A longitudinal incision is made extending through the cortex of the kidney down to the pelvis After the ureteral orifice has been demonstrated the gall bladder and kidney are placed in juxtaposition At the most dependent portion of the gall bladder an opening 1 5 to 2 0 centimeters in diameter is made

The circumference of this is sutured into the pelvis of the kidney by a series of mattress sutures through the entire thickness of the kidney as demonstrated in Figures 1 2 and 3 In some cases we have found it of advantage to cut off the pyramid thus giving a wider antrum for biliary drainage The kidney finally atrophies in any event and the excision of this tissue in no way affects the ultimate function

The incision in the cortex is closed by either interrupted mattress or continuous sutures Except for the escape of venous blood after incising the kidney there is surprisingly little bleeding The abdominal wall is closed in layers and a subcuticular stitch is used in the skin The wound is covered with a collodion dressing

Second stage The second stage consists in isolating and ligating the common duct A portion about 1 5 centimeters in length is excised The approach and closure are as in the first stage

If both stages are to be done at once we have found that the procedure is simplified if



Fig 5 Sagittal section of a stone



Fig. 1.—Complete anastomosis between hydronephrotic kidney and gall bladder.

the common duct is ligated and severed before making the anastomosis

RESULTS

Immediately after the first stage bile can be found in the urine in varying amounts but the animals remain at practically the preoperative weight The appetite is unimpaired and they soon recover from the effects of the operation The cholecystnephrostomy is covered by a thin layer of adhesions which soon forms a capsule The right kidney atrophies and appears like a diminutive hydronephrotic kidney with only a shell of renal tissue present If the gall bladder is completely detached from the liver surface there may be some obstruction at its neck with subsequent dilatation of the hepatic ducts The left kidney in the meanwhile hypertrophies markedly

Following the second stage the animals have been kept either for starvation or feeding experiments the results of which will be reported later

In these dogs we have found that periodic catheterizations reveal clear and uninfected urine The stools have been clay colored and free from bile pigment Cross section and microscopic study of the urinary bladder the anastomosed kidney and the liver have showed no evidence of infection No communicating channels were found between the

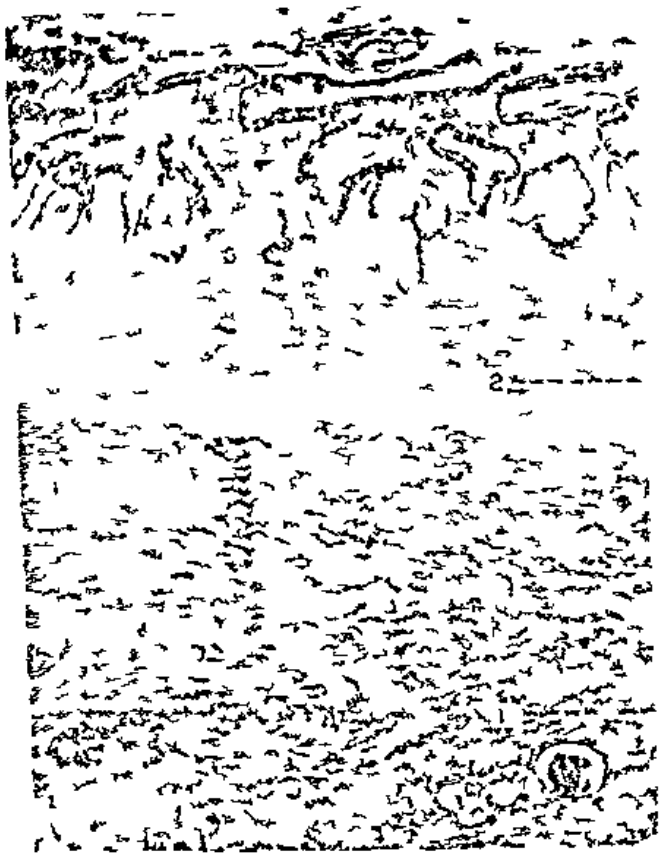


Fig 7 Photomicrograph of anatomos Note absence of infection in kidney gall bladder



Fig 8 Photomicrograph of anatomos Note absence of infection in kidney gall bladder

severed common duct and duodenum and the intestines were free from bile

SUMMARY

A new method of intra abdominal drainage of bile by a cholecyst nephrostomy with consequent exclusion of bile from the intestines has been devised for the purpose of studying its relations to metabolism The method does not allow for determinations of the total biliary output but pigment studies can be made It insures a biliary fistula free from infection and necessitating none of the inconveniences of dressings or collecting apparatus

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HEPATITIS A CONDITION ASSOCIATED WITH GALL-BLADDER DISEASE[1]

By CHARLES GORDON HEYD, B.A., M.D., F.A.C.S., New York
[illegible]

THE finding of varying degrees and various types of hepatitis at autopsy has been of such frequent occurrence that pathologists have accepted this finding as a commonplace of postmortem examination.

Hepatitis, using the word per se and distinct from either Laennec's or Hanot's cirrhosis, is casually mentioned by one reference only in Moynihan's *Gallstones and Their Surgical Treatment* under the head of hepatitis sequestrans and refers to hepatic slough incident to empyema of the gall bladder. Hepatitis is mentioned twice by Osler in his *Practice of Medicine*, once under the head of interstitial cirrhosis, referring to Laennec cirrhosis, and again under the head suppurative hepatitis, referring to abscess.

It will therefore be noted that hepatitis as a pathological or clinical entity in connection with abdominal disease has received but scant notice. Pathologically it has received more extended notice, but without any clinical data, for interstitial hepatitis is found repeatedly in postmortem examinations without the presence of such condition being noted during life and without the presence of any symptoms pointing to its existence.

Reidel in 1881 thought that the linguiform process of the right lobe of the liver depended upon disease of the gall bladder such as inflammation, stones, distention or traction through pericholecystitic adhesion.

It is more than probable that in minor degrees of hepatitis there are no symptoms, as the liver possesses marked regenerating power, and in any destructive lesion of the liver there are varying degrees of regeneration in the form of compensatory hyperplasia. This is particularly evidenced in sections from the liver in portal cirrhosis, where there is a marked hyperplasia of bile radicles, which in some cases reaches an extraordinary development.

Following the standardization of technical procedures directed against diseases of the biliary apparatus, surgeons have been noting a variety of gross and microscopic changes in the liver coincident with diseases of the external biliary apparatus. These hepatic changes have varied from minute pinpoint areas of fibrosis to gross enlargement of the liver with fibrous tissue replacement, with irregularity of the surface and change in the consistency of liver substance.

Our interest in hepatic changes accompanying or sequential to gall bladder disease was stimulated to a very great extent by a report by Stockton and the very excellent papers of Graham and Peterman. Graham was able to prove that in every one of his operative cases of cholecystitis there was the indubitable presence of a hepatitis upon pathological section of pieces of liver removed. In the last few years we have been particularly interested in (1) the microscopic changes in the liver in the presence of undoubted disease of the biliary apparatus, (2) the histological examination of portions of excised liver and the determination of the degree of degeneration of hepatic tissue, the amount of fibrous tissue replacement and whether the predominant change was associated with the portal vein or with the bile radicles, (3) whether the cases presenting macroscopic and microscopic evidence of liver changes would show any deviation in their blood chemistry that might be interpreted as suggesting a liver deficiency or liver dysfunction, (4) and further whether there did not exist in varying degree a clinical state as the result of deficiency of liver function. Our surgical procedures have assumed therefore a more thorough investigation of the liver during the course of abdominal operations, the removal of portions of liver tissue for examination, a preoperative and postoperative test for liver function, particularly the application of the alimentary leucocytosis or the so-called hemoclastic crisis of Widal. In addition to these the determination of rest

[1] Read before the American Surgical Association, April [illegible]

nitrogen both before and after operation and disturbances in the relationship of the nitrogen balance The purpose of our paper is to record the frequency with which a histological hepatitis exists in the presence of disease of the external biliary apparatus

The association of hepatitis with disease of the gall bladder or with disease of the small intestine cæcum and ascending colon is usually revealed by some increase in the size of the right lobe of the liver It has not been an infrequent finding to discover a typical Reidel's lobe extending down to the crest of the ilium and it is interesting to note that when there is an enlargement of the right lobe of the liver it is usually in the posterior half that the greatest enlargement exists The enlargement manifests itself from slight to considerable On an average the right lobe of the liver will be enlarged from 3 to 5 centimeters below the costal margin in the anterior mammary line

It is interesting to recall that Silvestri and other attempted to segregate liver function in regard to the right and left lobes of the liver It has been a frequent observation that when the liver is enlarged in diabetes the right lobe is affected while in Banti's disease and other splenomegalia it has been observed that the left lobe participates more particularly The work of Clenard and Serege lend emphasis to this contention for in their experiment the left lobe of the liver was intimately connected with the stomach and spleen while the right exhibited more definite relationship with the pancreas and small intestine The injection of staining fluid into the spleen invariably produced discoloration of the liver limited to the left lobe while injection into the superior mesenteric vein as a rule stained the right lobe of the liver more than the left

The color of the liver in cases of chronic cholecystitis has differed from that of the normal color Although we have placed very little significance on the color itself continuous observation seems to impress the fact that it is of a more yellowish color than the normal color of the liver

The consistency of the liver as manifested in removing sections and its pliability to instrumentation has been noted many times The absence of friability under manipulation has been accepted as due to an increase of fibrous tissue elements in the substance of the liver The edge of the liver instead of being smooth shows indentures and crenations

The surface of the liver not infrequently presents an uneven granulated appearance without the smooth glistening surface of the normal liver There are minute elevations and depressions due to the contracted trabeculæ of Glisson's capsule—glissonitis In the area of the gall bladder we find the greatest degree of fibrous tissue replacement in the form of plaques and fine lines of fibrous tissue extending from the gall bladder suggesting a rosette of divergent contracting trabeculæ The liver in this area cuts with greater resistence than elsewhere

The histological examination of portions of excised liver shows considerable variation and two pictures can ordinarily be obtained depending upon whether the hepatitis is intimately associated with the portal system or with the biliary system The essential pathology is ordinarily a round cell infiltration with varying degrees of fibrosis The liver cells are atrophic There is occasionally marked hyperplasia of the bile ducts and in general the degree of inflammatory reaction is not directly dependent upon the intensity of the infection in the gall bladder The large bile ducts and portal veins may be surrounded by scar tissue with marked infiltration with leucocytes

The liver the largest gland in the body stands midway between the general and portal circulation It concerns itself with the metabolism of all types of food material and does its work with venous blood in marked contradistinction to the kidney which performs its physiological function by the general process of oxidation The regenerative power of the liver is very marked as is evidenced in the extreme degree of hepatic regeneration that occurs in portal cirrhosis The fact that the liver is interposed between the general and portal circulation on the one hand and between the spleen and general circulation on the other allows it to react to a variety of offending agents either chemical or biochemical that may be brought to it through the portal system or have filtered into it through the spleen or are being carried directly by the

general circulation Theoretically the liver could be affected in four ways (1) by toxic agents circulating in the general arterial blood (2) by transmission of deleterious material through the portal circulation (3) by direct contiguity of tissue from adjacent organ and (4) by means of the lymphatic between the liver and gall bladder or between the lymphatic system of the gastroduodenal segment and liver

We believe that the liver is concomitantly or sequentially affected in most chronic gall bladder disease and less frequently in affections of the pancreas appendix and in pathological condition of the gastrointestinal tract generally

In our study of the after results of surgical procedures directed against disease of the external biliary system we found a group of surgical complications and death that could not be explained by the surgical trauma inflicted nor by the development of epsis and they were unaccompanied by shock gastric dilatation or kidney insufficiency Upon further study of these mortalities they seemed to group themselves into three types and for convenience we have so divided them The most frequent of these three types of clinical picture that we have observed after operations on the biliary tract is a condition of profound vasomotor depression The patient following an operation for cholecystectomy or drainage of the common duct has ordinarily been behaving quite as usual At the end of 24 to 36 hours without any apparent cause the patient passes into a pronounced state of vasomotor collapse with cold clammy extremities wet moist and leaking skin a very much stimulated mentality and a facial expression not unlike the facies of fear The condition is not associated with dilatation of the stomach and there has been ample evidence of kidney function The intravenous administration of a 10 per cent solution of glucose 1 000 cubic centimeters every 4 to 6 hours and continuous Murphy proctoclysis with tap water has usually brought about a recovery It is interesting to note that when this type of complication occurs it has usually been in cases that have had a previous operation upon the gall bladder and at the second operation have had drainage of the common duct with palpatory or manual manipulation of the pancreas For want of a better explanation we have interpreted this type of clinical picture as due to some pancreatic toxin or ferment as the result of the surgical trauma with inadequate liver protection

A second type of clinical picture occurs after a varying period of time usually the fifth day in patients who have had a comparatively simple gall bladder operation but who have been chronically jaundiced A normal convalescence has been progressing up to the time of the onset of a light degree of somnolence They may or may not have lost large quantities of bile through external drainage They slowly become stuporous and in the course of 12 to 24 hours pass into coma The temperature rises to 103 or 104 degrees kidney function has been adequate previous to this time There is no evidence of infection within the abdomen and the condition is not one of dehydration following too rapid loss of bile through the drainage tube Nor has there been any increase in the obstructive cholaemia itself that were present previous to the operation We have here a condition not unlike the coma of cholemia in a patient who is adequately drained and who has had no further increase of obstructive jaundice We have fed these patients their own bile either by allowing them to drink it or by giving it through a stomach tube and have not prevented the fatal outcome by these procedures This condition is essentially a coma occurring in a patient with a diminishing obstructive jaundice Are we dealing with a frank case of liver exhaustion similar to the terminal stages of a portal cirrhosis or similar to an acute yellow atrophy of the liver? None of these cases showed white bile at operation and all of them had external drainage of bile

Less frequently we have observed a third type of clinical picture that supervenes immediately after operations on the gall bladder This type is infrequent and it is interesting to note that it has occurred after rather simple operation on the biliary apparatus The lethal complication has terminated however a long history of gall bladder or biliary duct infection These patients as a rule have not

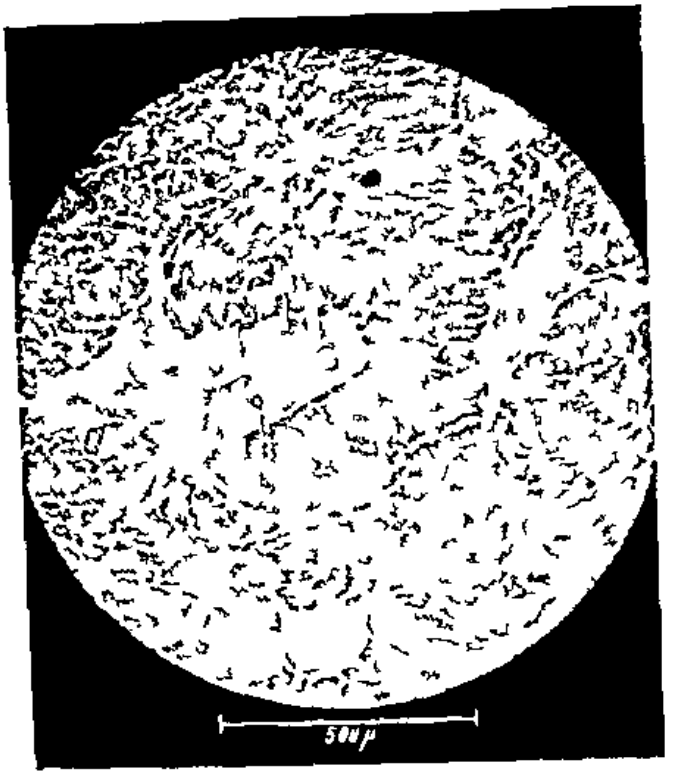


Fig Section of h er h wi g subacute interstitial h patiti f comp atively rec t ng apparently sub e q t to th cholecystitis wh ch was of lo g stand ng

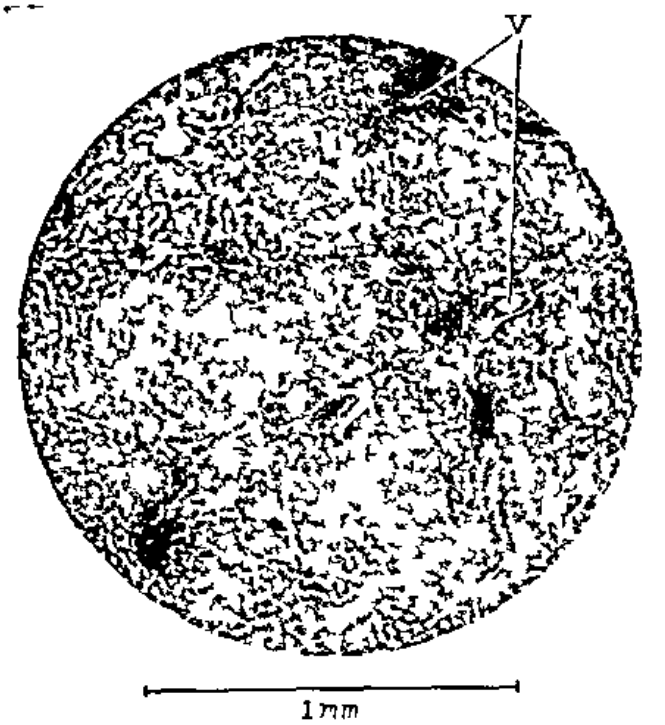


Fig 2 Ch onic i terstiti l hepat t and e ul r cir rhosis appa ently originat g about the b le ducts i p tal br che B bile d cts

been jaundiced The clinical onset is charac terized by the onset of coma almost imme diately following operation The patient ordi narily does not recover from the anesthesia a fact that should be noted The temperature rises to 104 or 105 degrees with marked accel eration of pulse usually subsultus tendinum carphology and talking delirium and more rarely marked motor excitation Chemical tests of the blood before operation demon strated that kidney function was adequate and within normal limits Spinal puncture after the onset of coma has revealed an in crease in fluid under pressure cell count of 10 to 15 per cubic millimeter with two plus globulin reaction and negative Wassermann examination

Dr John A Killian assistant professor of biochemistry of the Department of Biochemis try New York Post Graduate Medical School and Hospital has undertaken the study of this condition and we have been fortunate in being able to study the last six cases from a chemical point of view Of outstanding in terest has been the observation that the e pa tients show a carbon dioxide combining power markedly increased above the normal repre senting 80 to 100 volumes per cent This has not been due to the previous administration of alkalines and the condition has been desig nated chemically as an alkalosis So far as its fatal outcome is concerned it is much more pernicious than an acidosis Of the six cases recently studied four terminated fatally and all of these were instances of chronic disease of the gall bladder with simple operations

There exists in the blood plasma a buffer system comprising acid and basic compounds Under normal conditions the acid compounds are carbonic acid and acid phosphates while the basic compounds are bicarbonates and alkaline phosphates The normal blood plasma shows a slight excess of the alkalies over the acids this excess constituting the alkali re serve of the plasma The range of the hydro gen ion concentration in the normal plasma is then slightly to the alkaline side ($P_H = 7.4$–7.6) It is well known that an accumulation of abnormal acid bodies that is acetone bodies in diabetes or an increased concentration of



Fig. 3.—Variations in the alkali reserve during the course of treatment of a case of diabetic acidosis.

acid bodies normally present (acid phosphates in nephritis) lead to a decrease of the alkali reserve producing an acidosis. The most practical method of determining the extent of this alkali reserve is by measuring the amount of carbon dioxide that will combine with a definite amount (100 cubic centimeters) of blood plasma; the normal plasma should take up 55 to 70 volumes per cent of the carbon dioxide. A decreased carbon dioxide combining power indicates a lowered alkali reserve; this is an acidosis. A decrease in the combining power to 40 indicates a moderate acidosis; to 30 a severe acidosis; and to 20 an acidosis which will probably prove fatal. Cases of acidosis are comparatively frequent and the methods of relieving it are well known (Fig. 3).

A carbon dioxide combining power over 80 volumes per cent would indicate the clinical and chemical condition of alkalosis. Whether this increased carbon dioxide combining power is associated with a decreased hydrogen ion concentration has not been determined. The toxicity may be due to an accumulation of basic ions alone without an associated change in hydrogen concentration. These points are at present under investigation.

The normal blood sugar is represented in 0.90 to 0.120 per cent. In a great number of cases of chronic gall bladder disease we have found the blood sugar is raised having a variation from 0.140 to 0.200. This is due apparently to impairment of pancreatic function in that diastase (amylolytic ferment) which is elaborated by the liver acquires an increased activity. The pancreas normally regulates the activity of this blood enzyme and disturbances of the pancreatic function bring about an abnormal activity or a lack of regulation of the diastase with a high blood sugar. It would seem that an underlying infection of the gall bladder causes a disturbance of balance between diastatic activity and pancreatic control.

Under normal conditions the urea nitrogen forms from 11 to 15 milligrams and the uric acid another 3 to 4 milligrams. The two together with other similar nitrogen waste products represent about half the non protein nitrogen in a given quantity of blood. The remainder approximately 46 per cent is the undetermined nitrogen and represents the so called rest nitrogen. This finding in the blood is totally different from that in the urine where the nitrogen is in the form of urea to the extent of about 90 per cent of the total nitrogen. The inference to be drawn is that the body must utilize a part of the rest nitrogen in some manner because comparatively little of it appears in the urine. The liver function apparently is to split up the amino body much after the fashion of R–NH plus carbon dioxide and water equal urea.

In disturbances of the liver we find that the rest nitrogen is markedly increased. In acute yellow atrophy in the toxemias of pregnancy we find that there is a marked decrease in the urea nitrogen and the normal relation between non protein nitrogen and urea nitrogen does not obtain. Therefore the liver loses the ability to split up the amino compound into urea and hence there is an increase in the rest nitrogen in hepatic insufficiency.

Combined with the chemical determinations we have with the assistance of Dr. Ward J. MacNeal professor of pathology at the New York Post Graduate Medical School and Hospital regularly carried out a pathological examination of a portion of tissue removed either from the right lobe of the liver or from both sides. The association of observed macroscopic changes in the liver with a microscopic evidence of hepatitis can be summarized by the presentation of two cases not that they differ from others of the same type but they succinctly express the changes in the liver that we are accustomed to find.

Case 1. M. N. Chart No. 24403. Diagnosis: Hydrops of the gall bladder; chronic diffuse parenchymatous hepatitis; chronic duodenal ulcer; appendicitis.

Operative findings:

The liver shows a very marked [illegible] lobe the surface of which extends [illegible] normal for the individual. Extending back and

from the region of the gall bladder are lines of white fibrotic tissue giving a dimpled appearance to the liver surface evidently due to contraction of the fibrous tissue trabeculæ At various points on the edge of the liver are retracted areas most prominent in the region of the gall bladder and diminishing proportionately away from it

2 The gall bladder is the size of a large Bartlett pear with an entire absence of either green or olive color The wall is thickened contains white bile and about seventy five stones varying in size from 1 to 2 centimeters in diameter The cystic duct is obstructed The common duct is negative and contains bile

3 The pancreas is slightly hard to the sense of touch No gross pathology is evidenced

4 The stomach and duodenum are negative

5 The appendix is about 4 inches in length markedly distended with thickening of its walls and a considerable number of adhesions about its terminal portion

A cholecystectomy and appendectomy were performed on this patient and a portion of the right lobe of the liver was removed for histological examination I wish to quote in full the findings in the examination of the liver Sections of the piece of liver show a moderate increase in connective tissue of the trabeculæ of Glisson s capsule within the substance of the liver In this connective tissue there are excessive numbers of round cells and in some places conspicuous small bile ducts apparently hyperplastic The columns of liver cells are well preserved but among the liver cell there are some very large nuclei The endothelial cells lining the blood tissues are somewhat more numerous and more deeply staining than usual and in the e endothelial cells one finds an occasional mitotic division figure In the sinuses there appears to be also slight excess of round cell and polynuclear leucocytes The round cell infiltration in the connective tissue trabeculæ is rather diffuse and it i impossible to recognize that it has a closer relation to the bile ducts than the tributaries of the portal vein The changes are evidently those of an early cirrhosis Dr MacNeal makes the following comment Subacute interstitial hepatitis and early cirrhosis apparently of more recent origin than the inflammation in the gall bladder (Fig 1)

Case 2 B K Chart No 24682 Diagnosis Cholecystiti subacute cholelithiasis diseased appendix

Operation findings

1 The liver is slightly enlarged extending 2 centimeters below the costal margin in the right mammary line Some adhesions between left lobe and anterior abdominal wall Capsule of Glisson is somewhat opaque with white lines extending backward from the gall bladder and more particularly along the right edge of the liver external to the gall bladder notch where the edge is distinctly fibrous retracted and indented At this point are some adhesions between the hepatic colon and the omentum

2 The gall bladder is markedly thickened distended but free from adhesions It has a red blush to it Glands at the cystic duct are enlarged and the gall bladder contains about 100 sulphur colored cholesterin stones

3 Stomach and duodenum negative

4 The appendix shows chronic inflammatory changes

Operation consisted in cholecystectomy appendectomy and removal of portion of liver for examination Omitting the histological examination of gall bladder and appendix the examination of the specimen of the liver shows the following Sections of the liver specimen show a remarkable increase of fibrous tissue near one end of the specimen Here one sees nothing but fibrous connective tissue blood vessel and bile ducts over a triangular area which is approximately 3 millimeters in diameter At its base this triangular area includes a few columns of liver cells The adjacent liver tissue *shows general* thickening of the trabeculæ of Glisson s capsule and there is especially marked fibrous thickening about the larger bile ducts which occur *in this region* One of these bile ducts is about 0 8 millimeters in diameter The fibrous tissue around it is from 3 to 5 millimeters in thickness The liver tissue near the other end of the section also shows marked increase in the thickness of the trabeculæ and this connective tissue is diffusely *infiltrated* with round cells In this portion the liver columns appear to be well preserved and the lobules retain their normal shape and relationships The picture bears some resemblance to that of *Laennec s cirrhosis* but the fibrosis is far advanced at one end of the section and just beginning at the other The increase of fibrous tissue occurs about the bile ducts Apparently this specimen comes from *near one of the* large branches of the hepatic duct It also includes large blood vessels Dr MacNeal comments as follows Chronic interstitial hepatitis and irregular cirrhosis apparently originating about the bile ducts (Fig 2)

CONCLUSIONS

We may therefore make certain tentative conclusions

1 Hepatitis in some degree is almost invariably associated with chronic disease of the gall bladder and biliary ducts

Hepatitis may exist as the primary or secondary lesion

3 When hepatitis is the *primary lesion* infection takes place through the portal system with secondary infection of the gall bladder by way of the lymphatics When hepatitis is the secondary lesion infection takes place from the gall bladder by way of the extrahepatic and intrahepatic lymphatics

4 In the majority of cases the hepatitis is probably symptomless it may occasionally be sufficiently widespread to initiate changes leading on the one hand to types of biliary cirrhosis and on the other hand to types of portal cirrhosis

Cholecystitis may be secondary and of minor importance to the changes in the liver

6 Some cases after operation show a marked hepatic insufficiency

The liver pancreas gall bladder and gastrointestinal segment must be considered as one physiological and pathological system In case of neoplasm

expressing itself in varying degrees of pathological change in the other members of the group

8 Pancreatitis is a frequent concomitant in either hepatitis or biliary system infection

9 In hepatic insufficiency or hepatic dysfunction we find marked variations in blood chemistry

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NON TUBERCULOUS GRANULOMATOUS LYMPHADENITIS

By GEORGE H HANSMANN MD Boston
From the Pathological Laboratory of the Peter Bent Brigham Hospital and the Harvard Medical School

FOUR cases of chronic granulomatous lymphadenitis have recently come to the attention of the pathological department of the Peter Bent Brigham Hospital The resemblances of the disease to tuberculous lymphadenitis clinically and histologically led to animal inoculation and bacteriological study to determine whether or not the process was actually tuberculosis The literature was also consulted and it was found that in France it was a well recognized condition Because the disease is definitely not tuberculosis and is not generally recognized in this country the report of our cases is warranted being an attempt to characterize the disease as it occurs in this country

CASE 1 P B B H 35808 The entrance complaint was headache and fever and tumor in left groin The past and personal history is entirely irrelevant

Present illness The patient a toolmaker for 20 years first noticed a tumor in the left groin on September 23 1922 It grew rather rapidly until about October 2 since which time it has remained quite stationary For 3 weeks preceding admission he had chills and fever His temperature reached 106 degrees and he has been delirious at times He entered the hospital with a diagnosis of typhoid

Physical examination The lungs showed some repitant and piping râles and on one occasion increased breath sounds were noted The chest was otherwise negative A roentgenogram of the chest was negative There was a tumor in the left groin the second shape of a fat struggle It was slightly tender but not red or warm The temperature fluctuated between 100 and 104 degrees

Laboratory findings Hæmoglobin 96 per cent red blood cells 4 832 000 White blood cells varied from 4 000 to 15 000 Polymorphonuclear leucocytes 72 per cent lymphocytes 7 per cent large mononuclears 15 per cent

Pathology Number S 22 300 Gross description The specimen is a large mass of tissue removed from the left inguinal region The mass measures 12 by 6 by 4 centimeters The tissue is made up of fat enclosing numerous much enlarged lymph nodes which on section show numerous grayish white areas that vary in size from 1 millimeter to 10 millimeters in diameter From these lesions a purulent material can be expressed

Microscopic examination There are seen sections that show lymph nodes and surrounding fatty tissue The nodes are involved in a diffuse inflammatory process Lesions of various sizes are present The smallest lesions are composed of collections of endothelial cells (macrophages) and a few polymorphonuclear leucocytes Larger lesions show a softened center composed of polymorphonuclear leucocytes and débris and an outer zone made up of epithelioid leucocytes giant cells lymphocytes and granulation tissue In the very large lesions there is extensive necrosis The necrotic material contains very few cells and is surrounded by a dense boundary of granulation tissue in which there are many epithelioid cells and giant cells The inflammatory process extends beyond the lymph node Epithelioid cells giant cells and polymorphonuclear leucocytes can be seen in the surrounding fat The vessels in places are definitely thickened by an endothelial proliferation of the intima

Bacteriology B 2 828 Smears were made from the pus and were examined fresh and stained with methylene blue and carbol fuchsin The result was entirely negative in each instance Cultures of pus and tissue were made in lextrose agar Loeffler's blood serum medium blood agar and in lextrose broth No culture showed a growth after 96 hours incubation Sections were stained with Giemsa's stain for ordinary bacteria and with carbol fuchsin for tubercle bacilli No organisms could be demonstrated

CASE 2 P B B H 37633 A stenographer single age 46 years entered with complaint of abscess in the right armpit

Family history The patient has always lived in New England She had whooping cough and measles in

childhood and influenza in 1920 Her mother died of tuberculosis 30 years ago The patient was at this time associated with her mother She has always been subject to headaches of the migraine variety She entered the Peter Bent Brigham Hospital January 15 1923 and a careful study revealed nothing but obvious undernutrition and nervousness and a history of constipation and headaches

Present illness The patient re entered the hospital March 20 1923 with the above complaint Since her discharge from the hospital on January 31 1923 she had been resting and had not been beyond New England February 15 1923 2 weeks after leaving the hospital she noted a small red slightly elevated scar like painless lesion about the size of two pin heads on the back of her right hand February 21 1923 she noted a non tender nodule 1 by ¾ inches in two diameters in the axilla A few days later she awoke with a bad bilious attack This consisted of nausea headache fever and at times stiffness of the neck The fever and headache kept her in bed for 2 weeks On February 28 1923 the patient noted a lump at her elbow It was the size of a large marble non tender and rather hard The local physician incised the lesions of the hand about March 1 but apparently nothing was obtained After removing the bandage on about March 7 another lesion similar to the first was noted

Physical examination Undernutrition was again noted The physical examination was negative except for the local condition There was a red slightly elevated lesion about 3 millimeters in diameter on the right hand Non tender firm glands were present in the axilla and in the epitrochlear region There was a beaded vessel along the inner aspect of the arm evidently an indurated lymphatic The patient ran no fever while in the hospital except for a rise to 100 2 degrees following operation

Laboratory findings Hæmoglobin 85 per cent white blood cells 9 600

Pathology Operation March 3 1923 (S 23 216) The local lesion and lymph nodes were excised

Gross description The local lesion consists of a piece of normal appearing skin 1 by 5 centimeters in diameters It is interesting that the lesion had been overlooked by the local physician

Lymph nodes They are received in three pieces The largest measures 3 centimeters in diameter Its surface is covered with indurated fat and is injected on cut section It is divided into lobules evidently due to adherent lymph nodes Each lobule contains several small grayish white areas from which a sticky slightly green pus can be expressed Surrounding these areas is a wall of pinkish gray tissue 1 to 2 millimeters in thickness The second piece consists of a formless mass of tissue which is grayish in the center and bluish red and injected at the periphery The two pieces of tissue and approximately 3 cubic centimeters of sticky pus came from the axilla

The third piece consists of a lymph node about the size of an almond which comes from the epitrochlear region It is somewhat firm and is gray on cut surface There are numerous areas of necrosis from which a sticky pus can be expressed These areas are surrounded by granulation tissue 1 to 2 millimeters in thickness

Microscopic report Initial lesion Just beneath the corium is a very definitely circumscribed lesion about 2 millimeters in diameter This lesion is surrounded by fibrous tissue It is made up of endothelial cells (macophages) lymphoid cells fibroblasts and polymorphonuclear leucocytes Here and there within the lesion are collections of endothelial cells which contain an occasional giant cell The epidermis appears quite normal

Lymph nodes There are sections from three nodes One shows nothing but a slight amount of chronic inflammation The second section shows several small tubercle like lesions consisting of collections of endothelial cells occasional giant cell and a small amount of necrosis in the center The third node is peppered with lesions similar to the second but many of the lesions are much larger and necrosis is much more extensive The necrotic masses frequently contain many polymorphonuclear leucocytes and are surrounded by considerable amounts of granulation tissue

Examination of smears Smears were stained with methylene blue They contained many polymorphonuclear leucocytes endothelial cells and an occasional giant cell No organism could be found Examination of fresh unstained exudate failed to show any amœbæ or fungi

Bacteriology The pus and tissue were cultured on dextrose agar Loeffler's blood serum medium blood agar Dorsett's egg medium and in dextrose broth No growth was obtained Some of the pus was put under anaerobic conditions in dextrose agar and no growth was obtained

The pus and fragments of tissue were injected into three guinea pigs One pig at the end of 3 weeks developed an orchitis and peri-orchitis He was killed and a pneumococcus was found as the presumable cause No other lesion was demonstrated The other two pigs were killed after 5 and 7 weeks respectively and no lesion of any kind was found Some of the pus from the pig that developed the orchitis was injected into two other male pigs without *result*

CASE 3 The patient a housewife age 47 years developed a small indurated nodular non painful lesion in the upper dorsal region in October 1922 In December 192 the neighboring cervical lymph nodes became enlarged December 29 1922 the initial lesion and adjacent lymph node were excised Microscopic study of the tissue showed *marked hyperplasia* of the epithelium so marked that an epithelioma was suggested Beneath the skin was a marked inflammatory reaction No lymph node was made out On January 10 1923 two glands were removed for examination

Pathology Gross description of initial lesion H 22 35 There are two pieces of tissue one of

skin and the other of subcutaneous tissue The skin measures 5 by 1 5 by 1 8 centimeters From the center of the skin there projects a nodular mass over which the skin appears crowded On section this is found to be composed of firm tissue which is not definitely circumscribed The skin appears unusually thick The second piece of tissue measures 3 by 2 5 by 1 8 centimeters It is surrounded by fatty tissue and muscle The central portion of this mass is made of yellow fibrillar tissue

Lymph nodes H 1 18 The specimen consists of two post cervical glands They are surrounded by fatty tissue and comprise masses measuring 2 by 1 6 by 1 4 centimeters and 2 by 6 by 7 centimeters respectively On section they are found to be composed of pale yellow tissue in which are seen white punctate areas and a few strands of pale firmer tissue The consistency is quite soft

Microscopic report Primary lesion Sections through the nodule of the skin show the central portion occupied by a sharply circumscribed downgrowth of the epidermis in the form of anastomosing stalks which present an irregular arrangement of the epidermal cells composing them There is some keratinization but no definite pearl formation The free surface of the skin is covered by a thick layer of fused keratinized cells Surrounding these epidermal structures throughout the corium and in the subcutaneous tissue a heavy infiltration composed of plasma cells lymphoid cells endothelial cells and an occasional giant cell These cells also occur in miliary sized groups surrounded by young fibroblasts and bear a localized resemblance to tubercles In the subcutaneous fatty tissue is a definite lesion The central portion of the lesion is composed chiefly of granulation tissue with numerous areas of necrosis Surrounding this lesion in the fat tissue is a heavy infiltration of plasma cells endothelial cells lymphoid cells and an occasional giant cell of the foreign body type Stains for bacteria with Gram's stain and carbol fuchsin for tubercle bacilli are negative

Lymph nodes Section shows granulomatous areas with central areas of necrosis and softening These central areas contain a large number of polymorphonuclear leucocyte The granulation tissue bounding these areas shows a compact infiltration of endothelial cells and numerous giant cells beyond which are numerous lymphoid elements

CASE 4 I B B H No 38978 The patient was an unmarried negro of 28 years a laborer who entered the hospital complaining of a discharging abscess in the left groin

Past history Negative except for several attacks of gonorrhœa and an infected bubo which was removed in 1916

Present illness began in December 1922 following a slight headcold at which time he noticed swelling with little pain in his right groin This swelling became increasingly larger and troubled him when he moved his leg He visited his local physician who advised poulticing About December 29 the swelling became very soft and he again went to his local physician who incised the softened area A small amount of thick yellowish pus was obtained This wound remained open about 6 weeks when it closed The gland then increased in size the sinus reformed and gained access In the meantime several other sinuses formed After the sinus formation the glands became quite tender There were no general symptoms Evidence of a primary sore could not be obtained

Physical examination The patient was a well developed negro with a negative physical examination except for the lymphatic system X rays of the chest were negative for tuberculosis X ray of the pelvis showed no bone involvement The inguinal glands on the right side were enlarged and matted together forming a mass extending from about the midpoint of Poupart's ligament over the mid line and downward over the anterior aspect of the right thigh thus forming a triangle with a 10 centimeter base and 10 centimeter altitude Over this area were several elevations representing enlarged lymph nodes and seven sinuses were present The enlargement was somewhat tender and a few drops of white flaky pus could be expressed from the sinuses Around the orifice of each sinus was protuberent granulation tissue The patient has a normal temperature pulse and respiratory rate

Laboratory findings Hæmoglobin 80 per cent (Sahli) white blood corpuscles 5 700 Differential count is 60 per cent polymorphonuclears 20 per cent lymphocytes 12 per cent large mononuclears and 2 per cent eosinophiles

Pathology The entire region described above was excised down to the deep fascia taking with it all of the glands and diseased periglandular tissue

Gross description Specimen is an L-shaped piece of skin with subcutaneous tissue down to the deep fascia It was removed from the right groin The shorter arm is the vertical arm and is dissected off from the anterior inner aspect of the thigh It is 9 centimeters long and 4 5 centimeters in width The longer arm is 9 5 centimeters by 6 5 centimeters and extends from the fold of the groin transversely across the pubis The fold of the groin is creased and at its midpoint is an umbilicated depression which during life exuded thin yellowish pus. This umbilication is 1 by 5 centimeters Internal to this are three globular elevations covered by thin glazed epithelium They measure 8 millimeters 5 millimeters and 4 millimeters in diameter respectively The largest is pinkish The two smaller are yellowish in color On cutting through these elevations they are found to be made up of reddish tissue which has the appearance and consistency of granulation tissue These sinuses communicate with lymph nodes that are honeycombed by cavities lined by a gray membrane and containing a thin puriform material In the vertical arm of the tissue we have the lower half of the skin occupied by irregular smooth glazed elevations of the epidermis in which are numerous sinuses The subcutaneous tissue con

sists of fat with lymph nodes and a great deal of dense cicatricial tissue which is most marked near the fold of the groin where it is continuous with the corium for an area of 5 to 1 centimeter Embedded in this tissue are many lymph nodes varying in size from a few millimeters to 2 5 centimeters in diameter All the lymph nodes are deep pinkish in color friable in consistency and contain abscess cavities In only a few is evidence of scar tissue The cavities are small irregular and filled with a purulent material

Histological examination The sections include skin subcutaneous tissue and lymph nodes The skin shows a definite downgrowth due to a marked hyperplasia Beneath the skin is a heavy infiltration of plasma cells polymorphonuclear leucocytes and an occasional giant cell There is also extensive granulation tissue formation in this subcutaneous tissue This granulation tissue frequently lines sinus tracts There is marked perivascular infiltration with the above mentioned cells An occasional vessel shows marked thickening of the intima The lymph nodes are distorted by disease The capsules are distinctly thickened and fuse with surrounding tissue There are areas of granulation tissue in the glands as well as dense scars In addition to these older lesions are more recent lesions consisting of groups of endothelial cells in palisade arrangement about necrotic centers Among the endothelial cells are numerous giant cells while the necrotic centers contain many polymorphonuclear leucocytes and lymphoid cells Such lesions bear a strong resemblance to tuberculosis The germinal centers of the lymph nodes that remain are markedly hyperplastic

Examination of smears Smears show many endothelial cells plasma cells polymorphonuclear leucocytes and an occasional giant cell There are organisms both intracellular and extracellular Many cells are packed with bacillary form that stain poorly with Giemsa's stain Others are cocci arranged as diplococci and in short chains They stain deeply Because of the numerous sinuses in this case the material was considered of no use for cultural study

Animal inoculation Two guinea pigs two rabbits one rat and one mouse were injected with the material from this case The guinea pigs were injected subcutaneously intraperitoneally intratesticularly into the prepuce and into the testes The rabbits were inoculated subcutaneously into the anterior chamber of the eye intraperitoneally by corneal incision and into the testes

The rat and mouse were inoculated subcutaneously and intraperitoneally The animals were killed after 5 weeks and examinations were entirely negative except that the rabbit inoculated intraocularly developed a panophthalmitis 24 hours after inoculation and this infection destroyed the eye

REVIEW OF THE LITERATURE

Nélaton (9) in 1890 first clearly separated this disease from tuberculosis The differentiation was on clinical lines and he gives a very good clinical description His reason for believing these cases non tuberculous was the occurrence of local lesions followed by glandular enlargement He noted in one of his former cases that a small lesion on the little finger preceded axillary lymphadenitis of this variety He operated and found that the suppuration took origin within the lymphatic glands and discovered that excision led to cure Marion and Gandy (7) in 1901 studied the pathology and made animal inoculations They gave a very good histological description and were so impressed by the close resemblance of the histology of this condition to the histology of tuberculosis that they disregarded their negative results from animal inoculation and considered this process to be tuberculosis Pigeon and Tanton (10) in 1906 proved very conclusively the non tuberculous character of this particular type of lymphadenitis They injected 120 guinea pigs and not a single animal died of tuberculosis They also examined 140 freshly made smears from 147 cases and found no organisms

Bory (1) studied histologically a local lesion Phylactos (11) also studied a local lesion and his description corresponds to that of Bory He made a strong point of the identity of subacute granulomatous lymphadenitis and climatic bubo and insisted on the venereal origin of the disease This thesis is valuable for a complete bibliography

Ravaut (12) saw cells which on the warmed stage had amœboid movement and believed that these cells were amœba He thought that they resembled amœba coli rather than amœba histolytica He claimed good results from emetin treatment

Dufour and Ferrier (2) also reported a case with sinuses in the groin due to diseased lymph nodes which healed under emetin treatment

There are several other articles that deserve mention Durand Nicholas and Favre (3) in a very excellent article give a summary of their experiences and investigations of chronic granulomatous lymphadenitis They observed a large number of cases tried various bacteriological procedures and inoculated many animals with wholly negative results

Gaté (5) in 1913 made this disease the subject of his Lyon thesis He reviewed the

literature thoroughly He reported 16 cases and did some animal inoculation work which proved negative Gastinel and Rielly (4) in 1922 gave serious efforts to this problem They studied 20 cases very carefully and injected many different animals with negative results Their histological and clinical descriptions in this article are very exact These articles are important because they firmly established the clinical entity of this disease

DISCUSSION

Etiology The point of first interest in a disease is its etiology The etiological factor in this disease is not known and we are forced to rely on clinical and pathological evidence for ideas of the nature of the causative agent The clinical and pathological evidence indicate its infectious nature We have not been able to get information beyond that yielded by the histological studies Cultures have remained uniformly sterile except for the culture of a diptheroid by two observers both of whom considered the organism isolated to be a contamination probably correctly so considering the diverse lesions from which diphtheroids have been isolated The demonstration of organisms in the tissue and pus by practically all known technical methods have failed with the exception of Ravaut s observation (12) of amœba which has not been confirmed by subsequent observers

Our material was examined fresh and was stained with ordinary Giemsa s and Good pasture s stains for organisms No amœbæ were found We felt very certain none was present

The uniform negative results obtained from animal inoculations in spite of many attempts with many kinds of animals are most interesting There is some evidence that the infective agent may be transmitted from one person to another Gastinel and Rielly (4) speak of a case reported by Favre of a surgeon who contracted axillary granulomatous lymphadenitis following an injury of the hand received while operating on a case of the same disease Durand Nicholas and Favr (3) report a case of lymphogranulomato is in a lady whose lover was previously treated in the hospital for the same disease The infective agent in the skin and mucous membrane causes a very small lesion often only a half millimeter in diameter The characteristic histology is found in these local lesions We know that this infective agent operates in France and around Boston Two questions immediately came up in this connection Is this a new disease about Boston and are the areas mentioned in the literature the only places where the disease previously existed? We believe that the disease has existed elsewhere and that the area is much larger than that indicated in the literature It is probable that the diagnosis in the majority of cases has been tuberculosis To sum up the etiology we may assume that there is an infective agent in France and the Eastern United States which gains access usually through the mucous membrane of the external genitalia but may enter through the skin that this agent leads to a chronic granulomatous inflammation of the regional lymph nodes that there is some evidence that it can be transmitted from one person to another but not to any other animal and that cultural endeavors and efforts to demonstrate the organism in the tissues have been wholly unsuccessful

Bacteriology The question of etiology of this disease has stimulated a great deal of bacteriological work Nothing has come forth that can be entertained as a possible cause but in order to understand clearly what has been done it is desirable to review the range and results of the bacteriological procedures employed In such an extensive disease of lymph nodes secondary invaders are certain to be encountered and organisms cultivated which were considered as contaminators by the persons isolating them are staphylococcus (albus and aureus) streptococcus bacillus pyocyaneus and bacillus fluorescens liquifaciens

Two types of organism were considered possible causative agents one seriously and the other less seriously They are an amœba and a diphtheroid bacillus Only one observer has seen the amœba The evidence for amœba as the cause was based on the finding of cells that had amœboid motion on a warmed stage and the clinical improvement of a case treated with emetin hydrochloride The diphtheroid in question after discussion was dismissed be

cause it has been found in Hodgkin s disease and from other sources Stain have been used to demonstrate organisms in smears and tissues Here organi ms are occasionally seen In our Case 4 there are faintly staining intra and extra cellular bacillary forms and also what appear to be short chained strepto cocci In this particular case there were numerous sinuses and the importance of these organisms other than as secondary invaders is doubtful Many staining methods were employed by us Giemsa s stain carbol fuch sin methylene blue Goodpasture s stain Leishman s stain and Levaditi s method may be mentioned Fresh smears were also exam ined by dark field illumination All methods proved futile

Aerobic and anaerobic culture methods were tried Dextrose agar dextrose broth Dor set s egg media blood agar Loeffler s blood serum and Sabouraud s media have been used in attempts to isolate the causative agent

Much attention has been given animal in oculation Monkeys dogs cats white rats guinea pigs rabbits mice and fowls have been used Subcutaneous intramuscular intra peritoneal intracerebral intratesticular and anterior chamber of the eye routes have been tried Whether or not all of these routes were tried in each of the animals mentioned was not definitely stated in the literature Incision of the cornea of a rabbit with inoculation of fresh material and intracutaneous inoculation into the prepuce of the guinea pig were done in one of our cases with negative results The pro duction of a second cutaneous lesion in a pa tient who already had the disease was also tried without success

Marion and Gandy (7) produced local lesions in some of their animals These ap peared after 4 days and healed after 2 weeks Animals at autopsy were uniformly negative They believed that these local accidents were tuberculous Subsequent observers regarded Marion and Gandy s animal inoculations as negative while their description fails to con vince one of the tuberculous nature of the lesions they produced

Pathology The pathology may be dis cussed under two head viz the primary lesion and the lymphadenitis

The primary lesions are always very small many times only 1 to 2 millimeters in diam eter They are usually situated on the mu cous surface of the prepuce the vast majority of cases occurring in males in the sulcus behind the corona of the glans penis This is not invariable as they have been found on the glans and in the urethra and as shown in our cases on the hand and on the neck They are non painful and are often not noticed by the patient The lesions may take the following forms a small eroded area 1 to 2 millimeters in diameter a small area of indurated reddened skin an area of localized marked hyperplasia of the epithelium and according to some writers a small herpetiform lesion The two characteristics common to all types of lesion are their small size and non painful nature A third possible characteristic is their long dura tion though there are reports in the literature of the primary lesion lasting less than a week We must be cautious in interpreting these evanescent lesions as being the primary lesion of this infection It seems very improbable that the pathology of the primary lesions illustrating this article would appear and dis appear in the cours of a week It will suffice to say here that the lesions studied histologic ally were of several weeks duration In Bory s (1) case the lesion was present 2 months In our cases the duration of the local lesion was made clear in the protocols These proved cases should serve as a warning against giving undue attention to small le sions of short duration

The primary lesions studied histologically by Phylactos (11) and by Bory were identical Both came from the penis Each showed a small ulcerated area beneath which there was a very heavy infiltration of inflammatory cells consisting for the most part of plasma cells Very few polymorphonuclear leucocytes were present There was marked cellular infiltration along the lymphatics with cells of the same type In these lesions were many newly formed blood vessels and some thicken ing of the walls of the smaller blood vessels

In one of our cases the local lesion simulated a beginning carcinoma so closely that this diagnosis was considered for a time After the enlarged lymph nodes from the case came

to the laboratory it became clear that we were dealing with hyperplasia of the epidermis which was secondary to a chronic inflammatory process in the corium and subcutaneous tissue The inflammatory process consisted of an infiltration of corium and subcutaneous tissue in small foci with plasma cells lymphoid cells endothelial cells and an occasional giant cell These foci simulate tuberculosis One was particularly like tuberculosis in appearance It was lying in the subcutaneous tissue because of a central necrotic area and the presence of numerous giant cells On the other hand most of the lesions in the corium are without necrosis and form a picture reminiscent of the sarcoid of Boeck This process in the local lesions is identical with that in neighboring lymph nodes

In another of our cases the local lesion presented itself as a small area to 3 millimeters in diameter of slightly indurated reddened skin The skin in this area appears quite normal but beneath the epidermis is a small granulomatous nodule 2 millimeters in diameter In this nodule are endothelial cells giant cells and fibroblasts Again the histology is of the same nature as that found in the accompanying diseased lymph nodes

The disease in the lymph nodes has practically the same histology in all of our cases There are local areas of suppuration walled off by granulation tissue which is infiltrated with endothelial cells giant cells and lymphoid cells In some areas these foci have joined and the shape of the cavity thus formed which is filled with polymorphonuclear leucocytes is somewhat stellate In other areas there is very extensive necrosis with very little cellular response Some of the lesions resemble tubercles very closely When the disease has extended to the surrounding lymph node there is an exudate in this tissue similar to that in the gland There are areas of necrosis which tend to heal by granulation tissue There is also definite thickening of blood vessels by proliferation of endothelium

The lymphadenitis so closely resembles tuberculosis at times that tuberculosis should not surely be ruled out on histological evidence There are two histological differences which are quite constant and should suggest this condition The more important is suppuration instead of caseation in the center of the lesion Giant cells are not so frequent in the zone surrounding these suppurative foci which is the second difference

Climatic bubo has been suggested as a similar disease from time to time In his Lyon thesis in 1922 Phylactos asserted that climatic bubo and the disease under consideration are identical In reviewing the pathology of climatic bubo several textbooks on tropical medicine gave no characteristic histology They speak of a diffuse infiltration of plasma cells associated enlargement of the gland and thickening of the capsule and call attention to small areas of hæmorrhagic necrosis In 1910 Letulle and Nattan Larrier (6) made a histological study of a single case They concluded that the histology was not like tuberculosis and illustrative histological drawing did not suggest the condition with which we are dealing

Mueller and Justi (8) in 1914 made a careful histological study of climatic bubo and describe suppurative foci surrounded by endothelial cells in palisade arrangement This of course suggests the pathology of granulomatous lymphadenitis but they do not mention giant cell and their illustrations of the histology do not suggest the histology of chronic granulomatous lymphadenitis We feel that the identity of these conditions is not proved

Clinical course The clinical picture and course of the disease have been clearly described from time to time by different observers Nothing of much importance has been added since the original description of Nelaton (9) The reason for this is the close similarity of all cases The story is that of a small lesion which may easily escape notice and has been overlooked in more than half of the cases because of its small size and non painful character The lesion has usually been on the mucous membrane of the external genitalia notably on the prepuce but as shown in our case reports it may occur anywhere on the body The lesion when first observed may present one of several appearances vesicular (herpetiform) ulcerated with or without induration or wart like These different aspects



Fig. 1.—Photomicrograph. Microphotograph of the histology of the local lesion. Note the hyperplasia of the primary nodule and the presence of giant cells in the conuma and mutter of the granulomatous lesion.

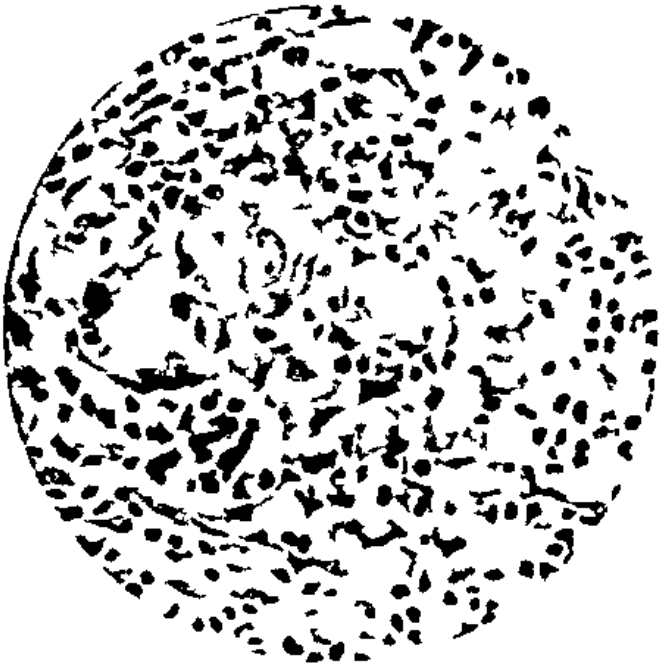


Fig. 2.—Photomicrograph. Microphotograph of the histology of the local lesion. Note the presence of giant cells and peripheral accumulated cells.

probably represent stages in the progress of the infection. Enlargement of the regional lymph nodes rapidly follows the occurrence of the initial lesions. They may enlarge quite rapidly at first and then cease to increase in size altogether or enlarge very slowly. While the glands are enlarging there may be general symptoms which consist of temperature, nausea, vomiting, and slight leucocytosis (10,000 to 15,000). The temperature when present lasts about 2 weeks when it returns to normal and usually remains normal. From this point on the course of the process is slow. The gland may become adherent to the skin due to the inflammatory reaction which was at first confined to the lymph gland extending to the surrounding tissues. Sinuses then form from which a small amount of sticky pus exudes until secondary infection takes place after which the pus becomes more abundant and less viscous. There are periods of subsidence and acceleration. The condition is extremely chronic and in this corresponds to the pathology. A number of glands with numerous foci of necrosis are walled off by granulation tissue and endothelial phagocytes. Each focus tends to reach the surface and to discharge by a separate sinus making healing slow inevitably. The glands are not hot or tender if examined before they become secondarily infected following sinus formation. After this occurs they may be somewhat tender. A number of glands are involved and the mass feels lobulated. The glands are at first hard but later develop foci of softening due to small areas of necrosis. Needle puncture may bring forth a few drops of sticky grey pus. Examination of the pus shows many polymorphonuclear leucocytes, many endothelial cells and an occasional giant cell but no organisms. There is very little pain associated with the condition. The patient may complain of a little stiffness and difficulty in walking if the glands are situated in the groin. The patients have been adult, usually male, from 16 to 40 years of age. In a series of 20 cases 19 were males. The groin is most frequently involved. The involvement may be bilateral but is usually unilateral and the left groin is more frequently involved. It will be noted by our case report that the distribution of the involved gland and the sex of the patient has not held in our cases. It seems quite clear that any gland may become



Fig 3 Photomicrograph of the kidney showing granular material in the kidney tubules Case of Ca

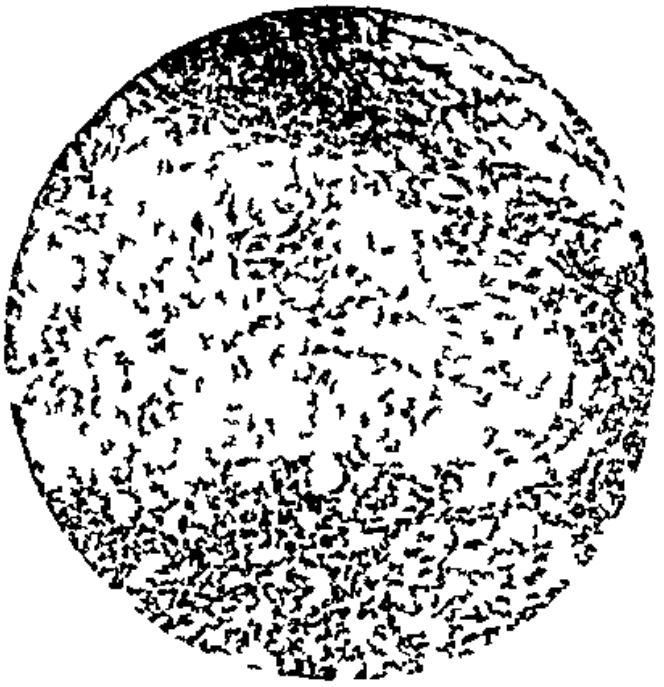


Fig 4 Photomicrograph of the kidney showing a lymph node with the palisading arrangement of the cells and giant cells about a softened area

involved since the infection may gain access through both skin and mucous surfaces It is not correct to maintain that this is a venereal disease or even a disease confined to the inguinal region Anything else that turns up in the routine physical examination is as far as is known irrelevant No lesions have been observed beyond the involved lymph glands The time relationships of the initial lesion the glandular enlargement and the general symptoms are brought out in the case reports

Diagnosis The difficulty in separating this condition from tuberculous lymphadenitis in clinical diagnosis is apparent The diagnosis at times may be difficult with tissues for microscopical examination When the clinical picture is complete viz the local sore the lymphadenitis and general symptoms it is not so difficult if we are dealing with a non tuberculous patient If only the enlarged glands are present it may be impossible to separate the condition from tuberculosis In this event animals must be inoculated with pus from the sinuses or the gland must be resected and studied histologically and by animal inoculation Histological examination alone is not always sufficient It is interesting to note that Marion and Gandy (7) in spite of their negative results from animal inoculation continued to regard this condition as tuberculous so deeply impressed were they by the histological resemblances

Hodgkin's disease is easier to rule out even in the absence of the complete picture Granulomatous lymphadenitis does not pass from gland to gland a group of glands is involved and the disease stops there Hodgkin's disease does not form sinuses or areas of fluctuation If only a few glands are involved and no fluctuation is present it may become necessary to remove a gland for diagnosis The histology of chronic granulomatous lymphadenitis does not resemble that of Hodgkins disease

Chronic glanders was thought of in one of our cases because of a small erythematous lesion an indurated lymphatic and subsequent enlargement of lymph nodes The history of contact with horses and especially horses that are diseased is of course important in this differentiation The local lesion of chronic granulomatous lymphadenitis is usually single and does not have the characteristics of the local lesions of glanders They do not exude a mucopurulent material as does the lesion of glanders In addition to what has been said

we can get very definite information on glanders by searching for the glanders bacillus and the effect of this bacillus on the male guinea pig The Mallein test is also available

Bubonic plague has caused confusion in France when there were a number of ambulatory cases This disease must be excluded by bacteriological methods In suspected cases glands should be punctured and bacilli demonstrated in the smears in cultures and by pathogenicity to guinea pigs

Chancroid may suggest itself Much here depends on the local lesion with its irregular serpigenous margin which usually extends The tendency to form a second lesion in adjacent tissue is also significant Again bacteriological methods are available

Syphilis should be mentioned It does not cause much difficulty The local lesion in the majority of instances is very suggestive The glands very rarely suppurate and when they do the suppuration is due to a separate infection either gonococcus or secondary pyogenic invaders Spirochætæ are easily demonstrated by dark field illumination By the time the glands are much enlarged spirochætæ have invaded the blood stream and we have a generalized glandular enlargement and a positive complement fixation test

Climatic bubo may be more difficult to differentiate The two diseases are held identical by one observer and do have many points in common Their identity cannot be disproved but we feel that the evidence is still insufficient to consider them as identical For differentiation we can only point out the differences The clinical history may be the same in the two conditions but usually the climatic bubo has quite a severe general reaction which quite frequently is absent in chronic granulomatous lymphadenitis A large percentage of cases of climatic bubo heal spontaneously which is not the case with chronic granulomatous lymphadenitis in our experience nor the impression obtained by reading the literature The histological description of the two conditions has been quite different Giant cells are not mentioned in climatic bubo but focal lesions in lymph nodes as well as the palisade arrangement of endothelial cells are described However it seems quite certain

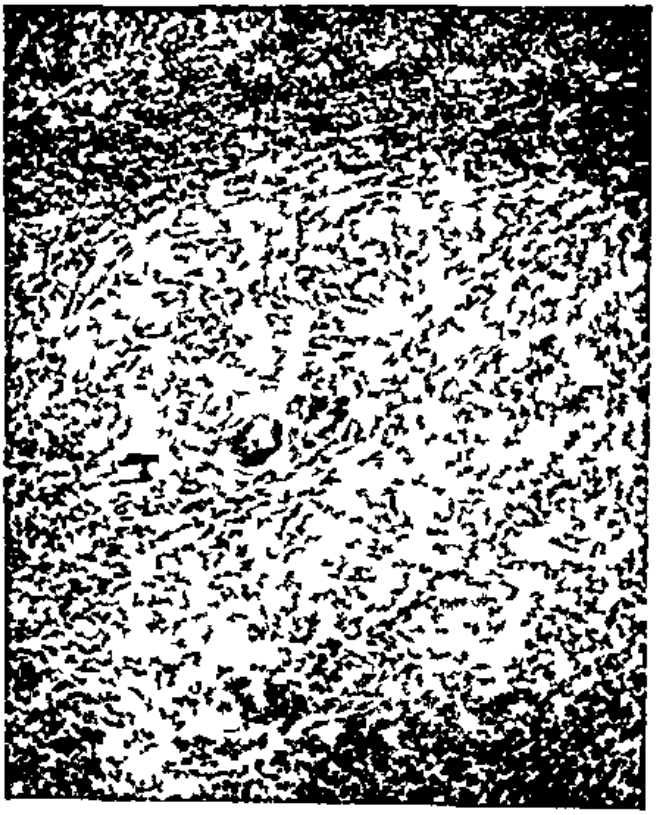


Fig 5 Photomicrograph in third inch objective It shows a tubercle like lesion a lymph nod

that focal lesions with palisade arrangement of nuclei are not always present in climatic bubo while the histological illustration of such a lesion in Mueller and Justis (7) article does not correspond fully with the histological picture seen in chronic granulomatous lymphadenitis

Prognosis and treatment The prognosis is never grave The possibility of spontaneous healing after softening of the glands has taken place is very doubtful Surgical removal of glands and surrounding tissue leads to prompt recovery

The treatment may be divided into medical and surgical *The medical* treatment has consisted of the administration of iodine iodides and more recently emetine hydrochloride The surgical treatment consists of draining softened areas or removing the entire mass of gland

The results of course depend largely on the treatment employed We may say with reference to the iodide and iodine treatment that one observer (10) using this treatment in 20 cases did not have a single case in which the

le ion healed after a long stay in the ho pital The reports on the results of emetin treatment are not numerous and we can only refer the reader to the enthu ia tic authors (6 and 7)

After the formation of foci of softening the only rational treatment i complete urgical removal It i yet too early to say whether or not emetin will be highly peci fic in these case If we recall the path logy we can ee how futile it i to try to drain the softened area because of the numbers and mall izes The only procedure from which we can expect result i the removal of all the affected gland and urrounding di ea ed ti u Thi i the treatment that Nelson found mo t effective and accor ding to the literature hi finding till hold good

Our cases were treated in thi manner and the re ults are a follow Ca e 1 was operated upon November 9 192 and was di charged December 7 192 cured Ca e 2 was operated upon March 19 and di charged April 19 2 cured She returned to the Clinic in May 1922 perfectly well Ca e 3 wa operated out i le on January 10 19 2 A report May 19 3 gave the information that he was well Ca e 4 wa operated upon July 1923 and the di ea ed lymph node ur rounding ti ue and kin on which the inu es pened was exci ed in one ma Following the operation there wa low grade infection of the wound but thi cleared up rapidly under unlight and Dakin s olution Becau e of the area of kin lo t it wa nece ary to kin graft Thi wa done ucce fully July 30 1923

The patient hould be operated upon befor inu es form The reason for thi i that the skin on which the inu e open mu t also be removed with the gland and at times thi area i quite large

SUMMARY AND CONCLU IONS

The article deals with a non tuberculou granulomatou lymphadenitis which i a clinical and path logical entity The infec tive agent enters through the kin or mucou membrane and leave a very mall non pain ful lesion which may per ist for ever al month The accompanying lymphadenitis i extremely chronic finally leading to peri adeniti and sinus formation The two di ea es that give difficulty in diagnosis are tuberculous lymph adeniti and climatic bubo The only way to rule out tuberculo i with certainty i by animal inoculation because the clinical pic ture sometimes is incomplete and at times th hi to logical resemblance to tuberculo i triking Climatic bubo is by some autho s con idered in di tinct di ea e There are some striking differences in the clinical hi to ry and path logy in these two di ea es

The bacteri logical procedures and animal inoculation have yielded no u gestion as to the etiology A far a is known the material i not pathogenic for animal other than man Surgery which aims at the removal of the affected gland and periglandular ti u when inv lved lead to prompt recovery

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AN ADENOCARCINOMA AND A ROUND CELL SARCOMA ARISING IN THE SAME UTERUS

A REPORT OF A CASE WITH A REVIEW OF THE LITERATURE

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THE exact status of a small group of cases in which a sarcoma and a carcinoma have occurred in the same uterus has been the subject of a prolonged and active discussion among pathologists especially interested in uterine tumors. Virchow (21) referred to these tumors under the name carcinoma sarcomatodes, believing that they were true mixed tumors in which both connective tissue and epithelium were represented in the neoplastic growth. Subsequent opinion has been divided, certain authors upholding Virchow's conception and others taking the view that the cases are instances of two separate tumors arising independently in the same organ.

The object of this paper is to report a case in which an adenocarcinoma and a round cell sarcoma occurred in the same uterus, with a brief review of the literature on this subject.

CASE REPORT

Clinical history. L. W., a white female, aged 60 years, was admitted to the Hospital of St. Raphael, New Haven, Connecticut, on January 18, 1921, complaining of vaginal bleeding. The family history was irrelevant. The patient was married at the age of 19 and had given birth to four children. She had had no miscarriages. Her menses began at 14 and had always been normal. At the age of 50 her periods became irregular and after about 1 year there was complete cessation.

The patient attributed the beginning of her illness to a fall about 8 years ago, after which she experienced a heavy sensation in the pelvis and noticed that her uterus was prolapsed. For about 6 months she had been in poor health and had lost a few pounds in weight. In the latter part of December, 1920, she noticed slight blood discharge from the vagina. A week later this bleeding became quite profuse and she came to the hospital.

The physical examination was essentially negative except for the abdomen and pelvis. There was a freely movable tumor mass extending from the pelvis to a point about 4 centimeters above the symphysis pubis. Vaginal examination showed a tumor filling the cervical canal. The surface of the tumor bled freely upon palpation.

Clinical diagnosis: Carcinoma of the cervix of the uterus.

Operation, January 19, 1921 (Dr. W. F. Verdi): Panhysterectomy. No metastases were noted in the course of the operation.

The patient was discharged from the hospital 3 weeks after operation and was apparently in good condition.

Subsequent course. For 3 or 4 weeks the patient was quite comfortable. After this interval a hard mass developed beneath the operative incision. There was severe pain in her back and great difficulty in defacation. The patient became gradually weaker and about March 15 developed a cough and raised blood streaked sputum. At this time she complained of tightness in her chest and difficulty in breathing. On March 25 she developed anuria, became comatose and died on April 1.

Pathological note (Surgical number 210, 1921): The specimen is a uterus with the right tube and ovary. The uterus is 9 centimeters in length. The transverse and anteroposterior diameters measure 4 by 2.5 centimeters at the fundus and 1.7 by 3 centimeters at the cervix. The external os measures 4 centimeters in diameter. The external surface of the uterus is covered with numerous adhesions. There is an ovoid tumor situated in the anterior wall measuring 7.5 by 5 by 4 centimeters and extending into the cervical canal. The portion of the tumor which projects from the cervix is smooth and glistening. A longitudinal section through the uterus reveals the entire tumor. Its cut surface is greyish white, very cellular looking and quite soft (Fig. 1). There are irregular areas of necrosis which give a lobular appearance to the otherwise homogeneous granular surface. In some areas the tumor extends from the endometrium to the serosa. In most places, however, a narrow border of myometrium is seen at the periphery of the growth. The remainder of the uterine wall is a shade lighter in color than its inner two thirds than in the outer portion. There are no tumor nodules in the posterior wall.

The endometrial surface is lightly irregular in appearance over the entire fundus. In the anterior wall this is particularly marked and examination with a hand lens shows numerous minute papillary elevations. Over the tumor in the anterior wall the endometrium also shows similar irregularities. The endometrial lining of the posterior wall is relatively smooth. The tube and ovary show nothing noteworthy.

Microscopic examination. The sections present an interesting and complicated picture with the characteris-



Fig An adenocarcinomatous and round cell sarcomatous tumor of the uterus Drawing of the right half of the transverse section of the body and fundus of the uterus showing the round cell sarcoma in the anterior wall of the fundus and the adenocarcinomatous growth covering the endometrium

tic features of a round cell sarcoma and an adenocarcinoma of the body of the uterus (Fig 2)

In the fundus and to a lesser extent throughout the body of the uterus the mucosa is irregular and shows numerous tufts and finger like processes projecting from the surface These processes form small mounds of epithelium consisting of several layers of cells without any supporting stroma and in some areas they are partially confluent and form nodular elevation of epithelium with crenated surfaces In other areas they form delicate fusiform or threadlike strands There are all gradations from a simple piling up of the surface epithelium to distinct papillæ having a definite supporting stroma (Fig 2 high power insert B) There are occasional branching strands with a few groups of glandular epithelium in the stroma The surfaces of the papillæ are covered with a single layer several layers of cylindric epithelium The cells are fairly uniform in appearance but in areas in which several layers are seen the cells are irregular in shape The nuclei are large and oval in shape varying from the clear vesicular to the deeply pycnotic Mitotic figures are occasionally seen Beneath the surface epithelium there are many typically carcinomatous alveoli These alveoli are irregular in shape and size and show numerous minute papillary projections into their lumina (Fig 6 high power insert A) They are lined with a single layer or several layers of epithelial cells similar to those described for the surface epithelium Throughout the uterine wall there are many glandular structures similar to those described above These glandular elements are not accompanied by endometrial stroma

In the peripheral portion of the uterine wall the carcinomatous alveoli are less numerous and show evidences of degenerative changes Throughout this area there is a large amount of mucoid material surrounding the alveoli and extending between and widely separating the muscle bundles

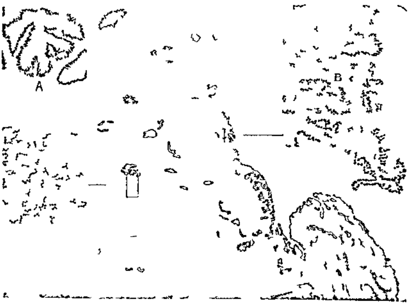
Sections through the large nodule in the anterior wall show a typical round cell sarcoma (Fig 2 high power insert A) The tumor involves the entire anterior wall and extends from the endometrium to the external surface There are numerous areas of necrosis throughout the tumor The cells are quite uniform in appearance and have relatively large round or oval vesicular nuclei Mitotic figures are occasionally seen There is a delicate interlacing stroma In some sections there are a few carcinomatous alveoli within the sarcoma

The case may be briefly summarized as follows There is a typical round cell sarcoma of the body of the uterus in association with an adenocarcinoma The latter tumor is atypical in that it does not present a definite focal neoplasm but is spread over the endometrial surface in the form of minute papillæ These minute growths are most marked in the fundus There is widespread invasion of the uterine wall by nests of carcinomatous cells

The sarcoma forms a large tumor nodule occupying a considerable portion of the anterior wall of the uterus There is extensive involvement of the endometrial stroma suggesting that this was the site of origin Occasional carcinomatous alveoli are seen within the sarcoma

The question might be raised concerning the possibility of the case being one of a diffuse adenomyoma associated with a round cell sarcoma but the entire absence of endometrial stroma (Cullen 4) accompanying the glands precludes this possibility

There are apparently two separate and distinct tumors one of which is a round cell sarcoma and the other a diffuse adenocarcinoma with areas in which one has invaded the other



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DISCUSSION

A review of the literature reveals only a few instances in which a carcinoma and a sarcoma have been found in the same uterus Cases in which the two types of neoplasms were found in the body of the uterus have been described by Rabl Rueckhard (19) Niebergall (17) Emanuel (5) Franque (8) Gebhard (9) Opitz (18) Nebesky (16) Schaller (20) Ballin (3) Frankel (7) Amann (2) Albrecht (1) and Ivanoff (13) and Montgomery (15) and Franque (8) have each found a sarcoma of the body of the uterus associated with carcinoma of the cervix[1]

An analysis of the nine cases in which the history was available shows that they all were in women who had reached the menopause The youngest was 47 and the oldest 64 years old One case was a nullipara the others were women who had had from one to five children The duration of the illness varied up to 4 years

In all of the reported cases the sarcoma had been polypoid in form with as a rule a very small pedicle In two instances (Rabl Rueckhard 19 Niebergall 17) the tumor was spontaneously extruded The histological structure in all cases was a round cell or spindle cell with giant cells present in three cases (Schaller 20 Opitz 18 and Nebesky 16)

The carcinoma was in all cases glandular in type (adenocarcinoma) and in most instances as in the case herewith reported definitely papillary in structure There was generally an involvement of a considerable portion of the endometrium In one case (Nebesky 16) there were areas showing a squamous cell metaplasia with typical epithelial pearls

The status of these cases has been the subject of a prolonged discussion and different authorities have expressed directly opposite opinions The name carcinoma sarcomatodes which implies a true mixed tumor was given

[1] Th re re mbe f dd tio l ses po t l rc sarc m todes or as in an es of th im l eo occ rr nc f rcin ma nd sarc ma in th sam ru wh h i l ded bec se h y h with tood h lc l min ion f bseq b rv rs

to these neoplasms by Virchow (21) Opitz (18) Nebesky (16) and Von Cube crow (11) are strong proponents of this conception and the latter author states that the combination of a sarcoma and a carcinoma is frequently observed in the uterus In spite of this statement the number of reported cases is already indicated is relatively small Kahlden (14) and Geissner (10) have taken the opposite view and express the opinion that mixed tumors of this character do not occur However they believe that a carcinoma may develop in a uterus in association with a sarcoma of relatively long duration

Herxheimer (12) reviewed the literature in 1908 and found only about twenty authentic cases of carcinosarcomata including the uterus ovary thyroid mammary gland pharynx oesophagus stomach gall bladder and pancreas He concludes that the majority of cases in which a carcinoma and a sarcoma have been found in the same uterus are not examples of a mixed tumor but of the simultaneous occurrence of two separate and distinct neoplasms Furthermore he believes that in many instances the diagnosis of a sarcoma has been based on the presence of a very cellular stroma in a carcinoma and also that some cases were instances of a sarcoma in which an atypical proliferation of the glands has been mistaken for carcinoma After a careful review of the cases he decides that there are at most only three to five instances of reported carcinosarcomata of the uterus which will withstand a critical analysis Among these he includes cases reported by Gebhard (9) Frankel (7) Nebesky (16) Opitz (18) and Franque (8) while Nebesky (16) includes the cases described by Amann (2) Ivanoff (13) Gebhard (9) Opitz (18) Frankel (7) and himself

In discussing the origin of carcinosarcomata Herxheimer mentions three possibilities (1) that a carcinoma and a sarcoma may develop simultaneously as the result of the same cause acting on different tissues (2) that atypical proliferation of epithelium on the base of a pre existing sarcoma may lead to the development of a carcinoma within a sarcoma and (3) that the stroma of a carcinoma may undergo a carcinomatous change

All three possibilities have been suggested for the explanation of individual cases The majority of authors have considered the sarcoma usually the largest tumor to be the oldest and have suggested the second explanation

Ewing (6) recognizes the occurrence of the following group (1) the simultaneous occurrence of two separate tumors which may invade one another (2) the development of carcinoma at the point where a submucous or mural sarcoma meets the epithelial layer and (3) carcinomatous changes in the glands of a sarcomatous or inflammatory polyp

In the reported cases in which the condition has been described the individual tumors include the usual types of uterine neoplasms namely the usual round spindle and giant cell sarcomata and adenocarcinomata with only a single instance in which squamous cell and epithelial pearl were also present

The case herewith reported showed a typical round cell sarcoma The carcinoma was atypical only in the diffuse involvement of the endometrium and the absence of a gross primary nodule The picture does not suggest a true mixed tumor but would appear to be a clear cut instance of the occurrence of a round cell sarcoma and an adenocarcinoma in the same uterus

The thorough study of this [illegible] type [illegible] published cases [illegible] Wilms [illegible] of permanent [illegible] almost [illegible] of permanent [illegible] portion of the [illegible] D Wilms [illegible] Mixed tumors [illegible] Carcinosarcomata which [illegible] rarely the [illegible] kingdom which the permanent were excised

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DEPARTMENT OF TECHNIQUE

A NOTE ON AMPUTATIONS WITH SPECIAL REFERENCE TO THE SLEEVE AMPUTATION OF THE THIGH IN SEVERE INJURY AND DISEASE

By SIR WILLIAM LEE WHEELER M.D. F.A.C.S. (Hon.) DUBLIN IRELAND

NOTWITHSTANDING the experiences of the War there is often hesitation in departing from time honored teaching. This is particularly noticeable in the case of amputation.

To those who were members of the War Office Committee of Surgeons and Limb Makers on Artificial Limbs (afterward attached to the Ministry of Pensions) it became obvious that many of the ideas about amputation disseminated through the medium of textbooks were fundamentally at fault. Thus it was generally agreed that there was no place or very little place for amputations about the foot which are associated with the names of Lisfranc Chopart Roux etc. and that Symes amputation could be improved upon by dividing the tibia and fibula at a higher level.

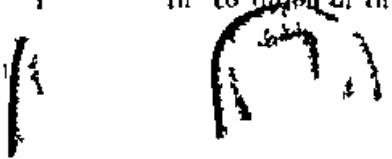
It was the opinion of most surgeon and limb makers that amputation through the knee joint were undesirable for it was impossible properly to fit an artificial limb to a stump constricted below the middle and broad at either end. Furthermore the projection of the knee joint of the artificial limb in the sitting posture was unsightly except in females when this deficiency was hidden from view by a skirt.

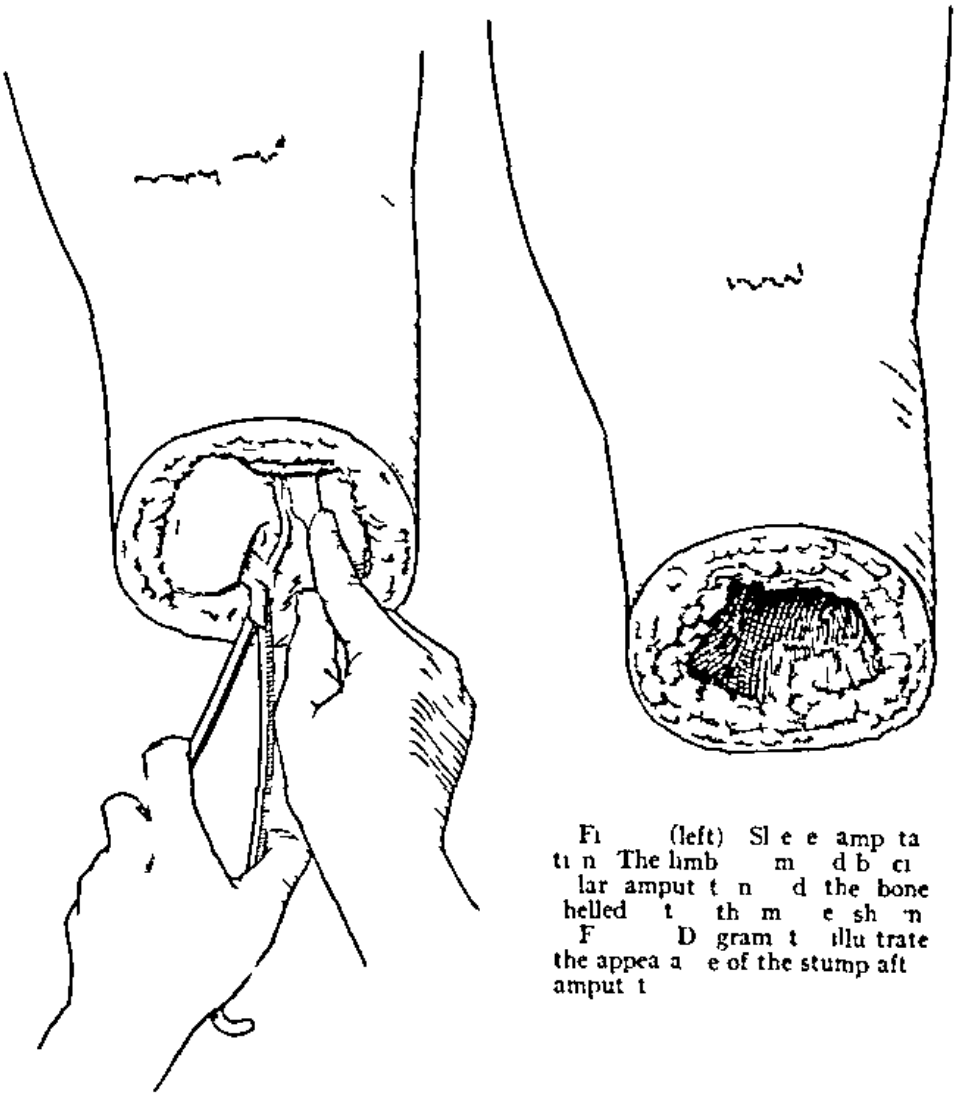
The operations of Larabœuf and Tealor were condemned by most observers and in most cases the retention of the patella in the operation associated with the name of Stokes and Gritti was shown to be a handicap to the limb maker unless section of the femur was made at a level unnecessarily high. Amputation at the hip was found to be best when performed by skin flaps and the muscle cut very short the neck of the femur being divided and the head left behind to fill up the acetabulum. The best results were obtained when the soft parts were cut so short that they could not push the artificial limb off the tuberosities. Operations less than 3 inches above and below the level of the knee joint or elbow joint were avoided. Corner did a service to the profession in emphasizing these matters and in pointing out that the amputations remaining in use in the lower limb were (1) amputation of the toes (2) Symes amputation (3) through leg amputation with skin flap (4) amputation of thigh with long anterior and short posterior flap and (5) amputation through the neck of the femur with skin flaps.

In the upper limb there remain (1) amputation of the fingers (2) amputation of the forearm with equal skin flaps (3) a circular amputation of the upper arm and (4) Spence's amputation at the shoulder.

The sleeve amputation referred to in the title of this communication is a method designed to meet certain emergency operations with the least possible surgical risk and with a view to the conservation of the longest possible stump. The orthodox method of obtaining healthy flaps well above the injury or disease departed from and the amputations carried very much lower than most textbooks would sanction.

Three patients at present under observation will suffice to illustrate the method of amputation which during the past few years has been found serviceable in these and many other cases. The actual operations carried out along the lines suggested by Sampson Handley but the general principles involved are not the same.





Fi (left) Sl e e amp ta ti n The limb m d b ci lar amput t n d the bone helled t th m e sh n F D gram t illu trate the appea a e of the stump aft amput t

fo th same ason d g t l mp es of th es el as mp ble \n ci was m d expo t th upp port of tl fem l a te y f a l ngtl f o 3 ch in o de t asc rtain it d t Th t p l sat m th ppe port o f t rs d a h l l b n sta t betwee f e d th mb \ ! m put t s q kly perf m d thro h th k ee j t ju t bo e the lin of d h t g g Th a carr d b e th m gin f th p t lla f ont a d th q in ep t so t d d d Th t t hme t f the soft t est th f m pa t d w th k f a d pen t l l t u t l th l ment ld be thd m by th t t y m m t f h y bo f p l k k f m bottl Wh tl as ta t r l sed th f m ral t r *tl er tl d h — t th d f th t mp tt tl le t th l th m b d d tl t d (T 3)

Th l l lf f th th h had n th appea a ce f th l fa t f y h h th h d d f m h e bee m d Th le l ft ope d l htl pa k d th od f m g uz

Th m n m l n t rupt l pt that th a t l h f th k n th pp p t f th th h H \ t o 3 ears ft perat n and wa lkin w thout pain dis m f t th h a t fc lle \sca b t the si e f the p lm of a h d in front d ated he the k n l ghed nd wa k rafted d the c th gh h ch tl e f m rul te posed s ll m k d o the inn r ide (F 4)

\ \ ay ph t aph ho d i gul tie b t the end f th fem a d the f mat n f well m ked teoph t O to the d quate en of soft tis the e h \e m n r e t o pain d comf t h t

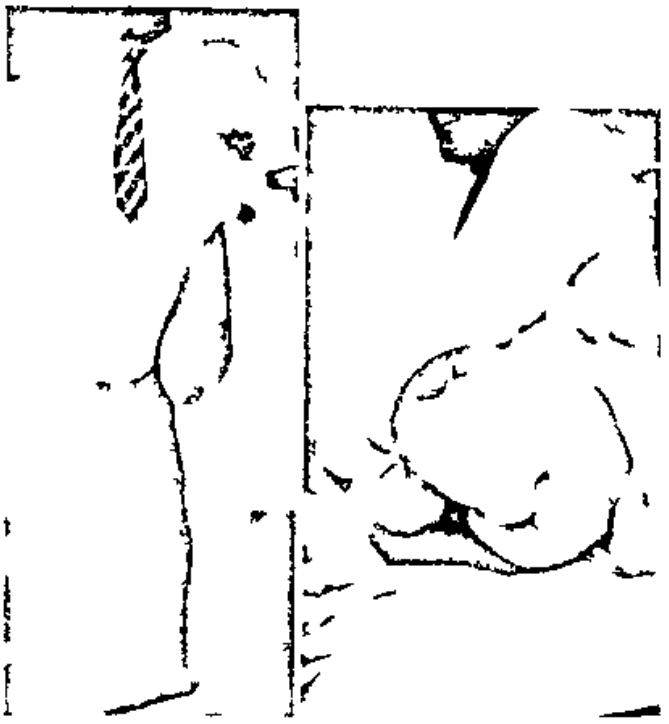
It is worthy of note that in the case and in the other two cases to be mentioned there was no tendency to abduction or flexion of the stump following the sleeve amputation and that a stump with all the appearance of approaching gangrene and with thrombosis of the main vessel recovered with limited sloughing of the superficial tissue

M b d L I B M J h t phy t



I 3 (l ft) C Th l g l t f p fi l l h th the t f xpo f th e l

F g 4 Ill trat g l t ry fl u f t p Ca



F 5 (l ft) Ca z C mp d f ct of f m r ppe th d \mj t t by sl e meth d 8 m th ft j y Th l f ct n a ll b l tl es s ft t

I 6 An ther w f C t d c t h w a p t t th gh th h p j t w a d d by d pt th l m thod

I am indebted to Doctor O Neill and Doctor Coady for their assistance and advice in the management of the case

C ε ll t te th goo l lt wh h be b- t d by mp tati g by th l e m thod ll b l w d t b eth f pt f t

I o pol m h t th pp po t f th l ft th h d t d mpo d f ct e f the f m H se 6 m th l t lt t th D O M ll y f (l

Th tt mpt t f th f t l bo Th soft t t th pp po t f th th gh th gi f th f t n ddl d th u E h d h mp g l d t b bo t th t f f t Th p t t y ill p l t l d em Th e w lb mu th n l th d bt d th t *der* ε *f* mp t t h ll b xped t l pe f rm d

T bt h lthy fl p d m th d mp t t th gh th h p j t th gh th k f th f m h p oc l h w b d th g t f m t d ab bt f th h h p mp t t f th pat t r y d q red co l t

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th first c se a l pe d with Th t mp c t d f a l ng l e ddl d th th n th ppe port

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C 3 Th th d ll t t th g f cutt th gh d t bo pt c t h d pt g th l pl f mp t t n t c f d se

A l d bo t f e t p s t d t e tm t M H p t l ff ed f m t m lt f th l d f h f m f F q t; lh t p t h l b pe f m d bef dm t th h p t l—th soft t e l t ll a d p t n rly ddl d th m y l d g t d d bo Th bo t d d y ll f m p l g l p A tt mpt t d l p t f th f t m lt w f ll d b p th l lf t t th j c t f th l th th m ddl th l f th f Th g l d t f th p t t r y poo d pa n w bt d t mp t t th th gh lf g p l T h t h lthy fl p t ld h be sa y t mm th p t n th m ll f th th gh d f th pp f gm t f th f m h bee fil d d t mm d th thod f h th 6 l t j ld ha b th h t f th h p j unt m g H po t f m th l mb m k po t f w

The usual c rc la inc s n was mad at the kn e j t the kn fe p *th ot gh* ept c tL e nd nuses in the g eat part of its co rse round the l mb In th ca it w s anti pat d th t there uld be d fficult in ecu in the vessel in the eptic d densely carred ti es a l in c nsequence th popliteal art ry was fr t exposed l gatu ed and d ided near the peri g in th a lduct m gnus A tourn qu t as employed W l en the leg w s rem d the l wer end of th f mu as held in a hon f cep a d extra ted f om the level f the path ol g c l fractu A f w titches er troduced in thi a e to bri g the d e f the lee together and a light ga pa k pl ced in po t n t en ur dra g

The illustrat ns h w p d heal f the tump 2 m nth aft r perat o (Fi) Ther no pa n n d- comf t a d the g neral c d ti n f the bo y i c m plet ly cha ged

The sleeve operation i suited particularly for cases of complicated fracture of the femur which are bad surgical risks There i no divi ion of bone with the saw and there i a proportional diminution of shock Furthermore it is usually better to leave the leeve completely open for drainage and contraction a procedure which saves a con iderable amount of time In all three cases the operation was completed in about 15 minutes

The operation is applicable to any position in the upper or lower limb the general principles being the same



I A Amp tat n by sle e method in ca e of pathol mc l f cture and osteomyel tis Th soft pa ts w e d d l th ou h n t abs e the sept c a ea

AMPUTATION OF THE LEG

In severe injuries and advanced di ease where Symes operation cannot be performed the operation recommended by Orr in *Annals of Surgery* November 19 1 has been performed in everal ca es in Mercer s Ho pital with entire ati faction

The site of election for leg amputation i in the middle third Long anterior and hort posterior skin flaps are made The deep fa cia i included in the former The posterior flap s made quite short and a flap of fa cia l fa h ioned from behind to turn over the cut end of the stump The mu cles are divided a couple of inches below the point of bone ection and the fibula i cut as u ual at a higher level than the tibia The perio teum at the cut end i carefully removed and the marrow i cooped out with a spoon The nerves five in number are drawn out of the tump a far as po ible and injected with absolute alcohol The nerve i then divided ju t below the injected point This prevents the formation of diffuse neuromata Sometimes as an alternative the nerve i cru hed and ligatured by the writer to prevent the growth and lawless distribution of neuromatou tissue

Mu cle flaps are not made nor is the muscle permitted beyond the end of the bone more than 1 centimeter Orr thinks that mu cle produces an unstable stump which is likely to become chafed or tender On the other hand the mu cle must not be allowed to retract and they are fixed round the end of the tibia with a single pur e string suture of strong catgut They are al o fixed to the fascia which is sutured over the bone

The operation gives a firm rounded stump with kin and fascia freely movable over the bone The muscles have a new insertion at the end of the stump which prevents their retraction and the expo ure of the bone beneath the kin

If it i necessary to amputate the leg at a higher level it is a great advantage to remove the fibula *in toto* Sir Robert Jone points out that in this way a piece of bone i removed which stands pre ure badly and at the same time the bulk of the tump i dimini he l so that a flap which would otherwi e be too small may uffice

A NEW AND RAPID METHOD OF BLOOD TRANSFUSION

Preliminary Report

By WALTER A NORTON M D F A C S Savannah Georgia
A ding geo t Joseph H p t l Co ing S geo Park V w San ta m

HAVING di covered that human blood when sucked into the syringe with sodium iodide (Swan Myers) does not clot immediately I determined to try it out in a blood tran fusion This I did with complete succes

The method employed was this I boiled a Luer syringe and while the syringe was still hot drew into it / the contents of a gram ampule of sodium iodide Into this same syringe I with drew from the donor 75 cubic centimeters of blood shook the syringe rapidly in passing from donor to recipient and inserting the syringe directly into the median basilic vein of recipient injected its contents This procedure I repeated immediately using the remainder of my ampule of odium iodide for the econd injection There was no clotting of the blood what oever and no reaction from the procedure It was accompli hed in less than five minutes

My method has the advantage over the sodium citrate method in that it requires no preparation save a sterile Luer syringe a drop of iodine on the arm of donor and recipient and a 2 gram ampule of odium iodide The blood is never expo ed to the air and the time necessary is reduced from half an hour to le s than five minutes

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A HOCKEY-STICK INCISION FOR INGUINAL HERNIORRHAPHY

By FRED W RANKIN M D F A C S Lexington Kentucky
Sec S gery L xingt Clinic

WITH the many inci ions for the approach and methods of repair for the cure of inguinal hernia already popularized by long usage in the hands of many operators any new method or modification of known procedures must nece sarily be offered with some trepidation

The cu tomary approach for the repair of an inguinal hernia which is made throu h an incision lightly above and parallel to Poupart s ligament gives ati factory expo ure in all cases and yet it i not infrequently difficult in adult and more than occasionally impo ible in infants to avoid contamination of the operative field The lower third of the inci ion i through the den e hair follicles of the pubic region where kin infection always lurk and consequently the avoi lance of wound infection from thi ource is occa ionally difficult A ati factory method of dres ing the ordinary inguinal inc ion wh ch will not only stay in place over the lower angle par ticularly but i not tedious of application ha not been found applicable to all cases The fold of the groin and the necessity of fa tening the dressing over a mobile surface like the upper part of the thi h account in many in tances for the di placement of the dres ings through the loo ening of the adhe ive traps incident to the patient tossing about in bed The double spica banda e reinforced by crinoline has been relegated to the past and yet it was a most atisfactory dressin except that it was time consuming and not economical It has been replaced almost uni versally by a single gauze pad held in place by adhesive straps It has been found advanta eous to supplement thi with a su pen ary in male patients

The incision de cribed here has distinct ad vantage both from the standpoint of operative exposure and from the ea e with which po top er ative dre sing may be applied safely and held in plac The line of inci ion which is in the transverse diameter of the abdominal wall i started in the mid line of the abdomen at a point about three inches above Poupart s ligament This bring the transverse arm of the incision through the kin lightly above the pubic hair line in women and in men throu h a thinning hair mar gin This arm of the inci ion is carried out to the inguinal fold meeting Poupart s ligament at an obtu e angle

The upper arm continues in the fold of the groin upward towar l the anterior superior spine of the ilium for a di tance of two to three inches but may be extended to any length to suit the

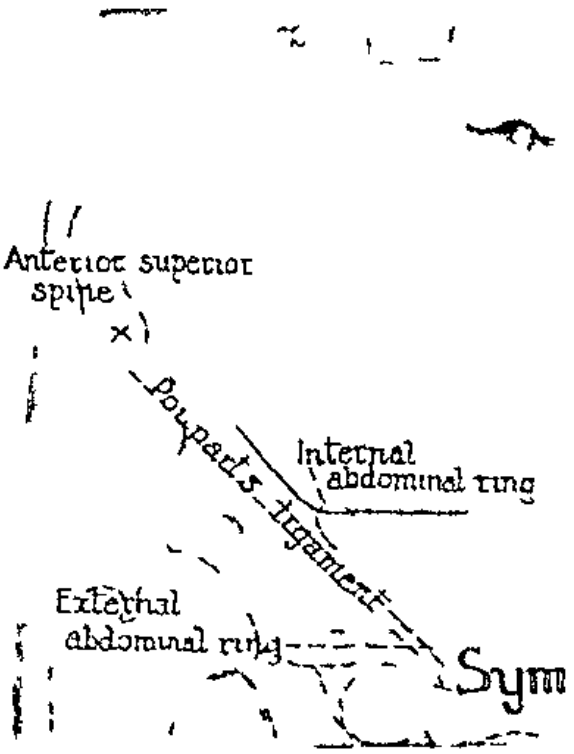


Fig. 1.—Line of incision and prominent landmarks.

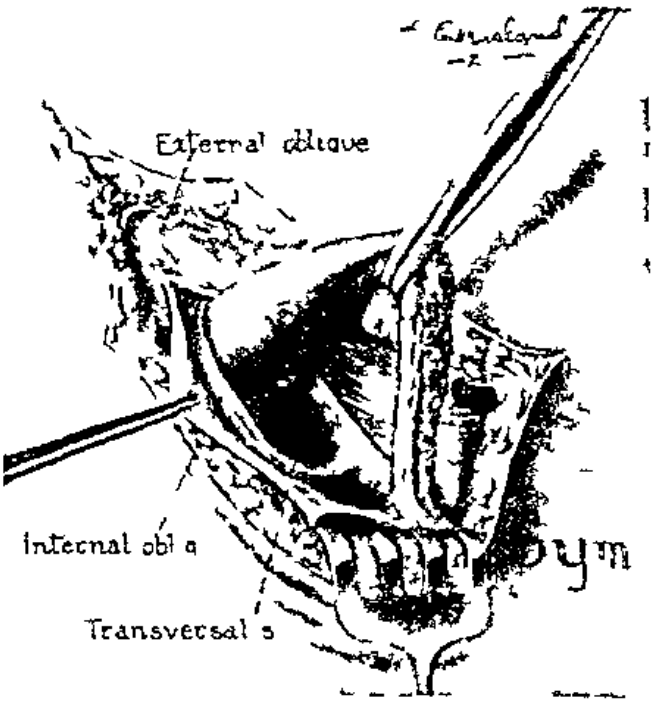


Fig. 2.—Incision retracted showing internal and external ring.

convenience of the operator. It should be emphasized that there should be no sharp angulation where the two arms of the incision join, but a gentle curve which will insure quick healing. The incision is best made as a single line of incision and not as two distinct arms, the knife blade being carried in a curved direction upon meeting the inguinal fold and the incision continued upward to its termination.

The lower flap is now undermined downward toward the symphysis and the spermatic cord is exposed emerging from the external abdominal ring. The upper flap needs little undermining but is retracted out of the field of operation by an assistant. The structures of the inguinal region will thus be amply exposed and the herniorrhaphy may be carried out by any of the standardized procedures.

I have used this incision in a large series of cases which included practically all types of inguinal hernia and have found it most satisfactory from the standpoint of exposure. In infants it is especially adaptable since the dressings may be applied to a flat surface where they are easily held in place.

THE RESECTION OF THE TWELFTH RIB AS AN OPERATION FOR TOTAL EMPYEMA

By CARL NATHER M D VIENNA AND ALTON OCHSNER A B M D CHICAGO
From the Department of Surgery of the University of Illinois and the Surgical Department of Presbyterian Hospital Chicago

A STUDENT of medical literature is struck with the number of various methods advised for the treatment of acute pleural empyema The chief procedures advocated are repeated or continuous aspiration of the exudate intercostal incision and rib resection

The experience of the United States Empyema Commission during the late influenza epidemic has shown that acute pleural empyema especially the streptococcic variety is divided into at least two stages This fact is not only of diagnostic and pathological importance but also a knowledge of it is necessary for the proper treatment of the condition

In the formative or early stage before the formation of adhesions the mediastinum is as shown by Graham and Bell freely movable Therefore only the conservative treatment as represented by aspiration should be used Any radical procedure producing an open pneumothorax is very apt to result in that critical condition known as mediastinal flutter

As the case becomes more advanced and adhesions fixing the mediastinum are formed so that there is no longer the danger of a mediastinal flutter the most satisfactory treatment in the majority of cases is a radical one However there are some cases in which empyema may be successfully treated conservatively i e by aspiration and the use of antiseptic solutions (Mozingo Moszkowicz Davis Major Phillips Delbet and Girode Reinhart and Oelgoetz Ramhoff Aschner and Beust)

In those cases in which conservative treatment has been tried and has failed radical treatment must be resorted to before the condition becomes chronic

Among the operative procedures are two principal methods Radical intercostal incision The exudate is in one sitting completely evacuated the fibrin removed and the wound closed (Lilienthal Whittemore Hathaway) Of great advantage with this method is the use of a differential pressure apparatus like that employed extensively in the European clinics (Ueberdruck) or inflation during the operation and at the subsequent dressing (Sauerbruch Jehn and Olermatt) The most popular operation and as a rule the one of choice is the drainage of an empyema by means of the resection of one or more ribs The site of the rib resection has been a much disputed question From the literature it appears that the seventh eighth and ninth are the ribs usually resected (Rodman McGlannan Egger Hollenbach Tuffier and Beust) However resection has been advocated of practically every rib of the thorax from the fourth to the eleventh It is self evident that in those cases of encapsulated empyema the resection should be done at a point where the best drainage can be obtained This point is always at the most dependent portion of the abscess cavity This fact holds good not only for the encapsulated but also for the total empyemata with which we wish to deal

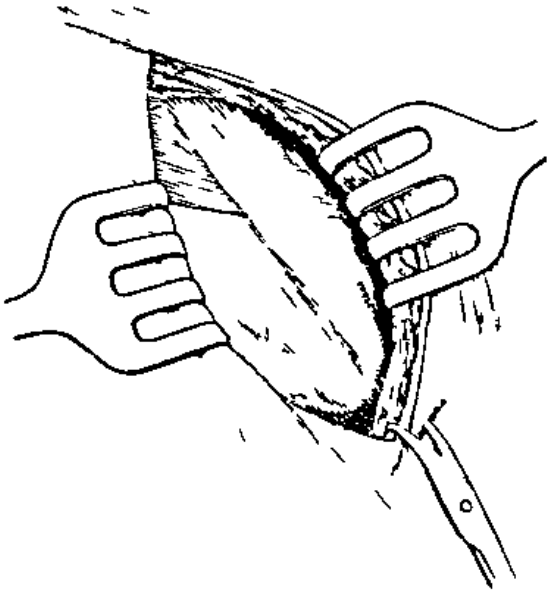
In spite of the fact that by far the greater majority of authors agree that a pleural empyema should be drained in its most dependent portion there is a great difference of opinion as to where this point lies after evacuation of the pus According to the different authors the point varies from the level of the sixth to the eleventh rib

This lack of uniformity is easily understood when one considers the number of factors which may effect the position of the diaphragm in cases of empyema Among the most important are the amount of the exudate the intra abdominal pressure and the condition of the diaphragm While it is true that in an exceptional case the diaphragm may ascend to the level of the sixth rib and in other cases some what lower there is only one point at which a complete pleural empyema can be drained at its most dependent portion This point lies in the lowermost portion of the pleural cavity which is the costophrenic angle

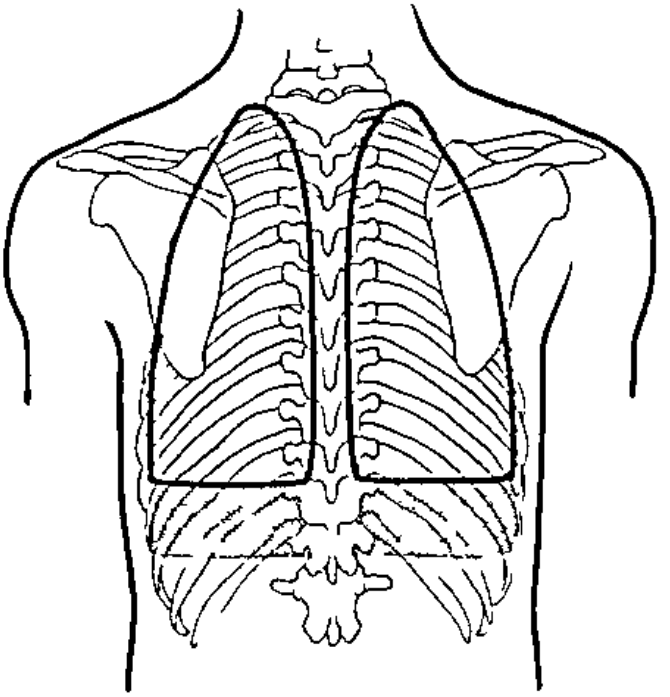
Therefore to insure sufficient drainage in *all* cases of complete empyema it is advantageous to drain at this point Barjon was able to show roentgenologically that in these cases the diaphragmatic excursion is considerably less than that on the unaffected side and that there is a flattening of the diaphragm which continues after the evacuation of the pus

Davis on the other hand found that the diaphragm is located at a higher level

This lack of agreement between the various authors merely emphasizes how very difficult it is to determine the position of the diaphragm This is especially true in cases of right sided em



Fi Ope t e woun l fter re e tion of the t lfth rib The bed f the t elfth b tr erse the w d bl quel In th uppe part of th ound can be n the lo rmo t po t on of the p et l pleur



Fi 2 Dia r m hown the rel tion bet een the pleura and the twelfth rib

pyema where the hadow produced by the exu date j ins that of the liver

Therefore before drainage is in tituted in ca es of total right ided pleural empyema it i clinical ly and radiologically impo sible to determine the po ition of the diaphragm or to predict what posi tion it will a_ ume after evacuation of the exudate It is then impos ible before the operation to make out the location of the mo t dependent point X ray studies before and after operation in the cases of empyema treated in the Surgical Clinic in Zurich how a variable po ition of the dia phragm even in tho e ca e in which it i po sible to vi ualize the diaphragm

While it i indeed probable that in the majority of ca e of empyema after evacuation of the pu the diaphragm assumes a higher level becau e of our inability to determine beforehand the amount of a cension it i alway safest and best to drain at the most dependent portion of the *tho ax*

In electing a point at which any cavity can be drained best one hould determine the most de pendent portion of the cavity by a fixed wall and not by a movable one In the ca e of the thorax thi most dependent portion i in the co to-phrenic angle in the region of the twelfth rib (In a previou article on ubphrenic ab ces we mentioned the po ibility f an empyema drain age by resection of the t elfth rib)

The drainage of empyema in the co tophrenic an le ha been advocated by Ashhur t Berard and Dunet and Chevrier but we have been unable to find any mention in literature of treatment of empyema by resection of the twelfth rib alone

Ashhurst mentions that ometimes it is advis able to resect the twelfth rib in combination with resection of the tenth and eleventh

Chevrier empha izes the fact that the deepest point in the thorax is in the costophrenic angle posteriorly near the vertebral column He was able to show on cadavers that resection of any rib above this point resulted in retention

The variation in the position of the movable wall of the thorax the diaphragm mu t be com pensated for by some pecial mechanical means We fulfil thi requirement in our operation as hown in the following technique

TECHNIQUE

Local anæ thesia (per cent novocain adrenalin / cubic centimeter i 1000 adrenalin to 100 cubic centimeters) Infiltration over the twelfth rib and conduction anæ the ia of the ninth tenth eleventh and twelfth intercostal nerves on the affected side

The patient lies in the emi itting po ture and reclines to ward the health side Incision i made over and down to the twelfth rib The erector pinæ mu cle mas is only partially inci ed the uninci ed portion i retracted medially

Subperio teal re ection i made of the *entire* twelfth rib The upper margin of the wound i

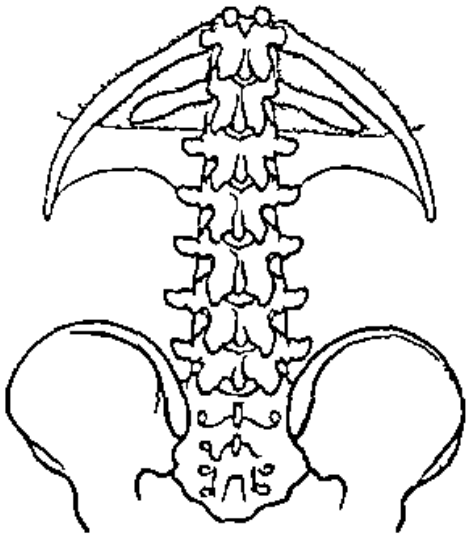


Fig 3

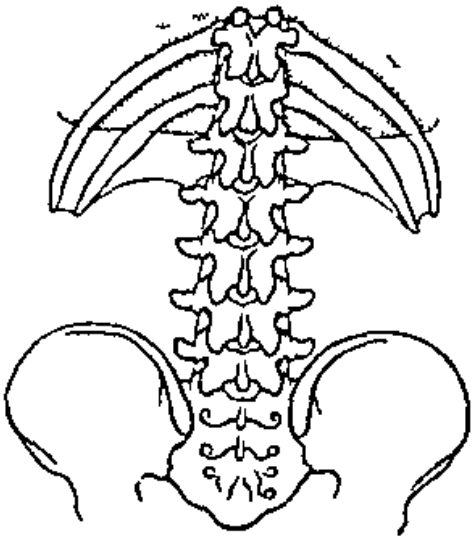


Fig 4

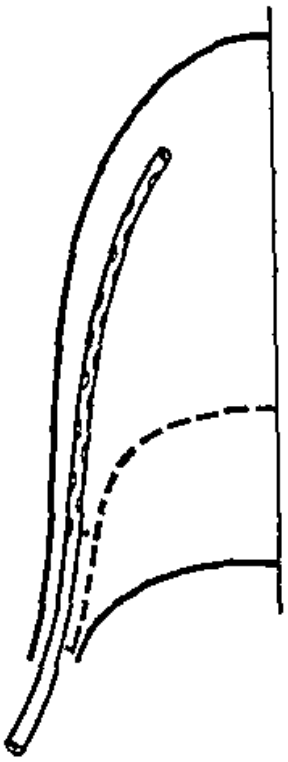


Fig 5

Figs 3 and 4 Showing the relation between the lateral extent of the costophrenic angle and the pleural cavity with the long axis of the thorax

Fig 5 Draining the empyema cavity obtained by means of the flexible rubber tube introduced through the opening of the diaphragm

elevated by blunt broad retractor This brings into view the costophrenic angle between the eleventh rib and the vertical column See Figure 1 (Figs 3 and 4 show the relation between the twelfth rib and pleura in cases of different rib length) In cases of total empyema the pleura instead of appearing as a smooth glistening normal membrane is thickened œdematous and infiltrated

Exploratory puncture is made by means of a needle inserted in the costophrenic angle which by continuous aspiration is advanced *perpendicularly* along the thoracic wall The perpendicular position of the exploratory needle is important in order to avoid an injury to the diaphragm

If pus is obtained the parietal pleura at the point of insertion of the needle is *transversely* incised In those cases in which the costophrenic angle is not obliterated this procedure is sufficient to secure evacuation of the pleural contents However in case the parietal and visceral layers of the pleura in this region are adherent the adhesions when fresh are loosened by means of a blunt periosteal elevator up to the free cavity

If by the exploratory puncture no pus is obtained and the costophrenic angle is obliterated by old dense adhesion the costal pleura is bluntly loosened from the thoracic wall up and for a short distance This is easily accomplished especially in cases of empyema because of the œdema The exploratory needle is then introduced into the pleural cavity at the highest point of separation of the parietal pleura from the thoracic wall Upon obtaining pus the pleura is incised along the needle

A small incision is made for three reasons

1 The exudate can be gradually removed without producing shock

In those exceptional cases where the operation is performed in the early or formative stage before the mediastinum becomes fixed the danger of a mediastinal flutter caused by a large open pneumothorax is avoided

3 By means of large drainage tube all case of total empyema can be completely drained

The removal of fibrin masses as advocated by a number of authors I do approve of as these substances serve as adhesives to unite the two pleural layers and thus assist in obliterating the cavity after evacuation of the pus

After the gradual removal of the exudate the cavity is explored by means of a pair of large curved forceps In this manner it is possible to open any encapsulated abscess which might coexist and also determine the extent of the empyema cavity Before insertion of the drainage



Fig 6 Roentgenogram of the chest demonstrating the position of the drainage tubes before shortening

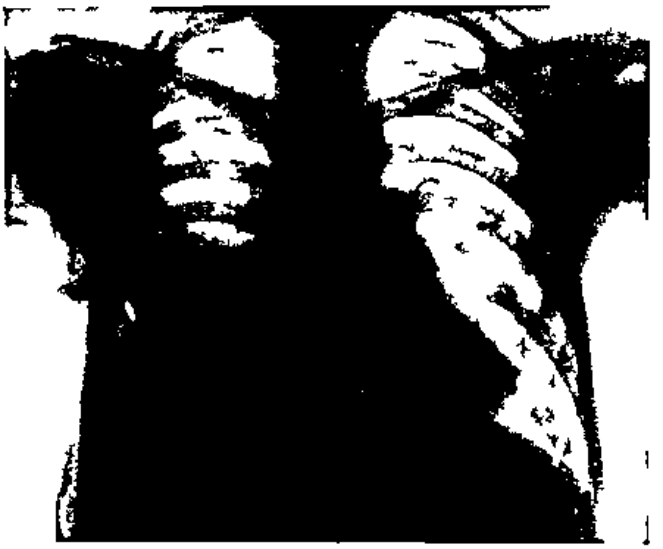


Fig 7 Roentgenogram after the partial withdrawal of the drains The ends of the drains project above the dome of the diaphragm

tubes the patient is leaned toward the affected side so as to drain off all the exudate

Two large thick rubber drainage tubes with numerous lateral holes are inserted up to the apex of the cavity By means of these tubes with their numerous lateral openings we obtain complete drainage of the pleural cavity independently of the position of the diaphragm (Fig 5) A large safety pin is inserted into each tube at the skin level and that portion of the tube distal to the pin is cut away to prevent any pressure on the tube from the dressings The tubes are fastened by means of long narrow strips of adhesive plaster over the safety pins The wound is superficially tamponaded with iodoform gauze The patient is placed in a sitting position in bed and inclined somewhat toward the affected side

POSTOPERATIVE TREATMENT

Daily dressings are necessary because of the profuse drainage during the first few days after operation However because of the small size of the wound and its location the dressings are practically painless and not unpleasant

According to the general condition the drains are shortened within the first day In this way we prevent with certainty the formation of a lung decubitus The shortening is facilitated when done under the control of the fluoroscope It is possible to see exactly how much the tube must be removed to allow the end to project just above the dome of the diaphragm (Figs 6 and 7)

In case a portable fluoroscopic apparatus is not accessible a simple X ray picture will give a very good idea of how much the drain must be shortened to obtain the desired result

After the shortening of the drains light breathing exercises are begun Any one of a number of contrivances may be used to assist in the re expansion of the lung The two water bottle system described in the American literature is satisfactory

The amount of drainage the general condition of the patient and the temperature curve are dependent upon the subsidence of the lung process The temperature which falls somewhat after the drainage of the empyema gradually becomes normal As soon as this point is reached one drain is completely removed After several days depending upon the amount of drainage the second drain is removed and replaced by another of the same length but of a smaller caliber

When the cavity becomes obliterated by the expansion of the lung shown roentgenologically the secretion practically disappears and the temperature remains normal the tube is either clamped or corked If the temperature still remains normal and after to 3 days there is no retention the tube is completely removed The wound closes then within 3 to 4 days

DISCUSSION

The drainage of a total empyema must be considered from a physical anatomical and physiological standpoint

Physically the cavity should be drained in its most dependent portion

Anatomically this is best accomplished in the costophrenic angle posteriorly by resection of the twelfth rib

Physiologically one must consider theoretically at least an active element produced by the movement of the lung Delbet and Circle and Fitzwilliams consider the physiological factors as the most important one in the drainage of an empyema They believe that the drainage should be done at that portion of the thorax where the lung expansion is greatest and not at the most dependent portion of the pleural cavity According to their theory the lung acts as the piston of a syringe and literally forces the pus out of the thoracic cavity

We disagree with these authors and believe that the physiological factor in the drainage of a pleural empyema can be to a great extent disregarded Pathological lungs such as exist in the presence of an empyema cannot expand as a normal lung would and naturally cannot be of much assistance in the evacuation of the exudate

The anatomical and physical factors are therefore more important in the drainage of an empyema than the physiological

The exudate by virtue of its weight seeks the lowest level which in the case of a pleural empyema varies considerably Because of this variation and the impossibility of predicting preoperatively the position of the lowest point of the empyema cavity after the evacuation of the exudate it is always safest to drain at the most dependent portion of the *pleural cavity* Anatomically this point is located in the region of the twelfth rib

By drainage of an empyema with resection of ribs other than the twelfth there is the possibility of a space existing below the site of drainage in which the pus is retained

The resection of the twelfth rib in contrast to the partial resection of other ribs produces a wound composed only of soft parts This characteristic does away with one of the important causes of the development of a permanent fistula because as soon as the drainage tubes are removed the wound edges fall together and obliterate the drainage canal

In those cases where a portion of one or two ribs has been resected the presence of the ribs produces a wound which in itself has a tendency to remain open because of the inelasticity of its walls This condition is indeed an advantage as long as the infection is present and there is any drainage It is however a decided disadvantage as soon as the infection has cleared up and a healing of the wound is desired

By resection of the twelfth rib we attain the ideal While an infection exists we obtain complete drainage of the cavity by means of large heavy fenestrated rubber tubes After cessation of all drainage and subsidence of the infection we remove our artificially produced plinths of the wound and secure an immediate closure We are thus able to shorten the convalescence considerably We can avoid absolutely the formation of a residual abscess by the simple procedure of clamping the drainage tube for a day or so before its removal to determine whether or not all infection has subsided

By the partial resection of any rib in the presence of an infection such as empyema there often results an osteomyelitis of the remaining portions of the rib This condition judging from the literature is the cause of the formation of a chronic empyema in a large number of cases (Moschcowitz Willensky Butler Flagg and Haverstock Schochet and Eggers)

By resection of the twelfth rib *in toto* we prevent this complication and eliminate one important cause of the production of a chronic empyema

Within the last year we have used this method of treatment in all the cases of total empyema admitted to the Surgical Clinic in Zurich Our results have been much more satisfactory in this series of cases than in those treated by partial resection of other ribs We have been able to obtain complete drainage in all cases and have shortened the convalescence considerably The average time taken for the complete healing of the wound was 4½ weeks

CONCLUSION

1 Drainage of a pleural empyema at the anatomically most dependent portion is the method of choice The physical and anatomical factors in drainage are more important than the physiological

2 The position of the diaphragm in cases of empyema varies considerably before and after operation Preoperatively it is impossible to determine what position the diaphragm will assume after the evacuation of the exudate Therefore it is safest always to drain at the most dependent portion of the *pleural* cavity

3 The resection of the twelfth rib allows access to the pleural cavity at its anatomically most dependent portion

4 A small pleural incision prevents the production of a large open pneumothorax In those

cases operated upon in the formative stage of the empyema before the mediastinum is fixed there is no danger of a resulting mediastinal flutter

5 By means of large heavy rubber drainage tubes with numerous lateral openings the pleural cavity can be completely drained independent of the position of the diaphragm

6 Cases of empyema treated by resection of the twelfth rib have a shorter convalescence

7 The formation of a chronic fistula is practically impossible because as soon as the infection has cleared up and the drainage tubes are removed the walls of the wound fall together On the other hand partial resection of a rib produces a splinted wound the tendency of which is to remain open

8 Total resection of a rib does away with the possibility of a resulting osteomyelitis of the rib and therefore one factor in the formation of a chronic empyema is eliminated

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END-RESULTS OF A NEW UTERINE SHELF OPERATION FOR THE RELIEF OF CYSTOCELE

BY HERBERT L SMITH M D F A C S Nashua New Hampshire

At the first meeting of the New England Surgical Society held in Boston in October 1916 I presented a paper descriptive of a new method for the surgical relief of cystocele The procedure which is very simple both in principle and application consists of employing the uterus as a support for the protruding bladder very much in the same way as it is utilized in the interposition operation but with the difference that instead of turning the uterus upside down without fundus underneath the urethra that organ is retained in very nearly normal position the cervix being sutured firmly to the triangular ligament at the point at which the latter helps to form the external meatus When secured in this position the uterus acts precisely as a shelf upon which the bladder rests and the procedure might well be called the uterine shelf operation

When this paper was read 8 cases had been operated upon by the time it was published the number had been increased to 16 A few of my colleagues and I have used the method somewhat over sixty times Believing that a sufficient time has now elapsed to permit of definite conclusions as to the surgical and clinical results I have recently collated the statistics in as many of the cases as could be traced The number from whom replies have been received or who have been examined personally is 140 Before giving the detailed results of this inquiry I will describe the operation briefly and make some remarks as to the type of case to which it seems especially applicable and also give certain points of technique which have been developed

The first time the operation was performed was largely a matter of chance It was done on the spur of the moment and without any intent of establishing a new operative procedure It happened in this way Some 10 or 12 years ago while performing the standard plastic operation for the relief of a large protruding cystocele after the

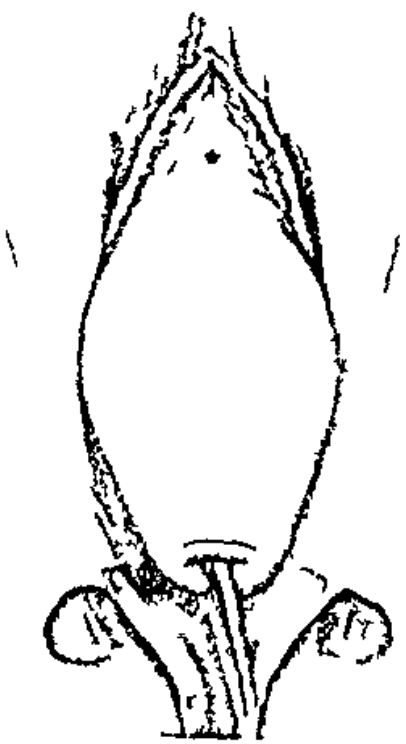


Fig. 1. Showing the appearance of the tumor after it has been delivered through the vulva. The bladder is seen at the top of the tumor and the cervix at the bottom.

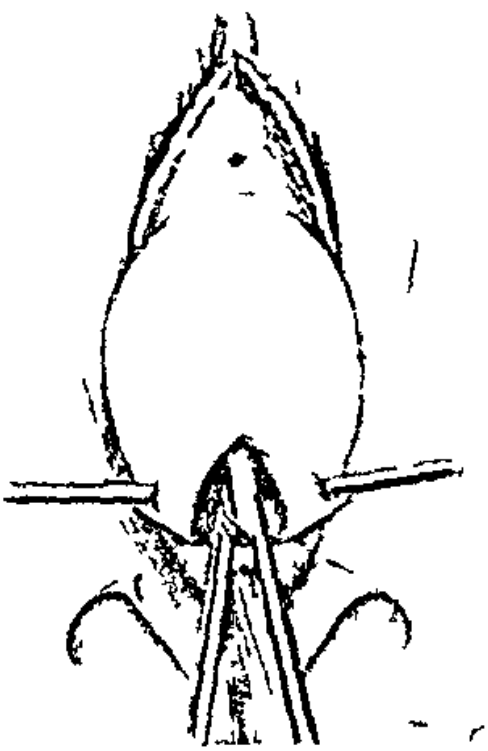
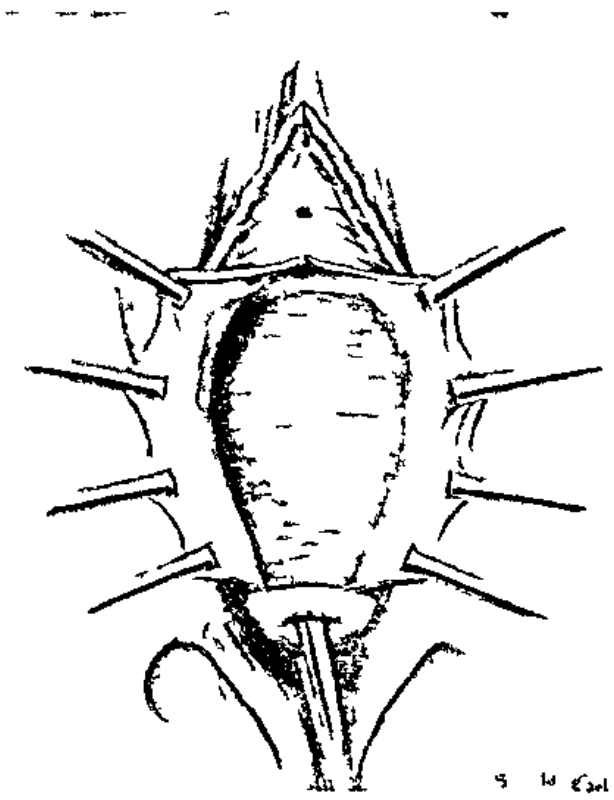
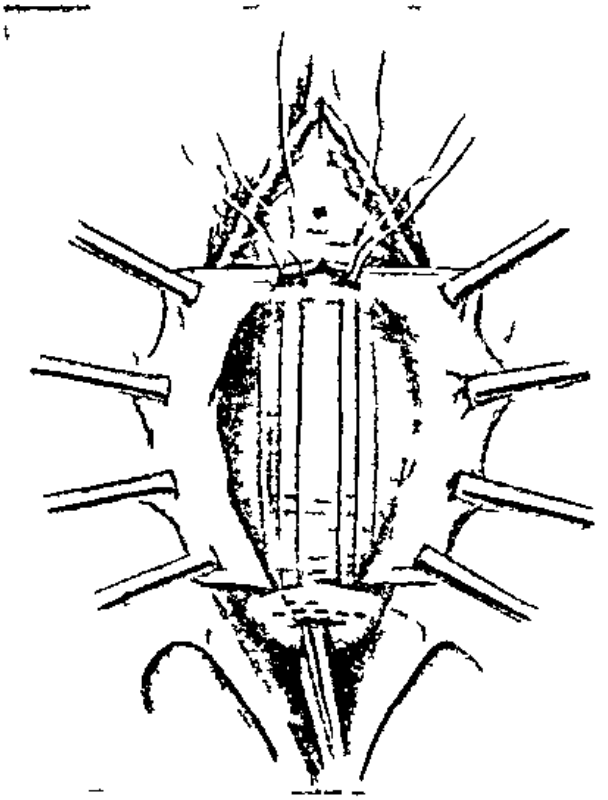


Fig. 2. Diagrammatic sketch showing the position of the bladder and uterus after the operation is completed. The point of the bladder is drawn forward to the triangular ligament.



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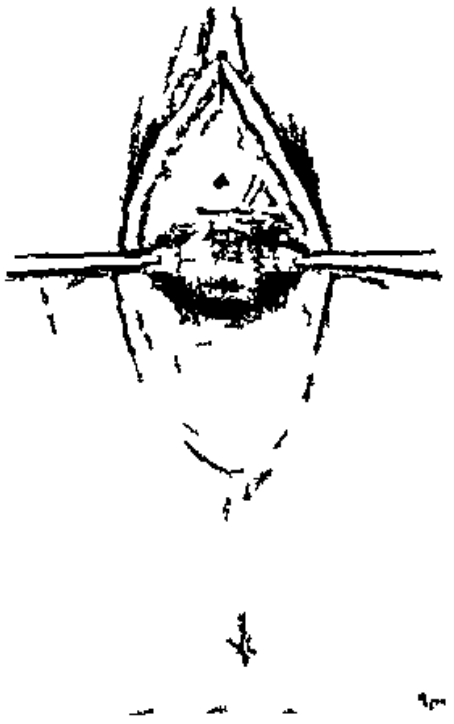


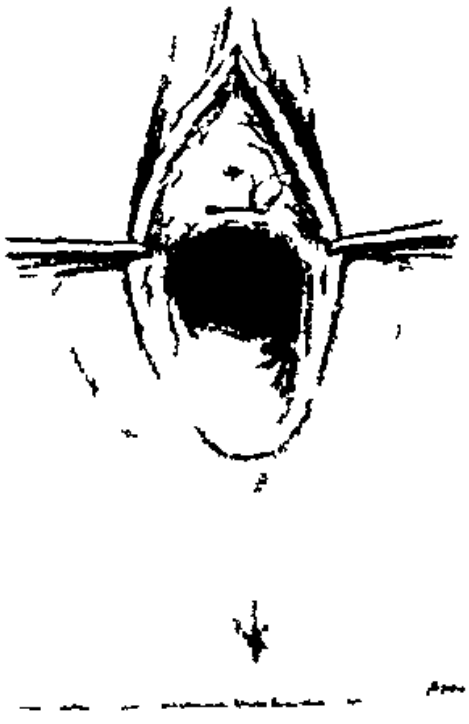
Fi 4 S t es in pl The tw bun d tu e to be ti d lat r bo the tn ul r li am t ar of chromi c tgut The t e wh ch em es th ough the muc u m mb ane nd t be t d ju t belo th m atu of ulk rm gut It is u u lly ll ed t ema n f se er l w eks

vaginal mucous membrane had been dissected off I was about to introduce the usual series of interrupted sutures running from side to side when I happened to lift the cervix upward toward the meatus and remarked to the surgeon who was assisting me What do you think would be the result if the sutures were put in up and down instead of crosswise suturing the cervix close up underneath the meatus This was done I found a goodly amount of tough fibrous tissue below the meatus which seemed to afford a good bite for the sutures My chief fear at the time was that the weight of the uterus with the pressure of the bladder above it might affect the urethra and cause some difficulty in micturition The result of this first case proved entirely satisfactory The cystocele did not recur and there were no urinary or bladder symptoms whatever

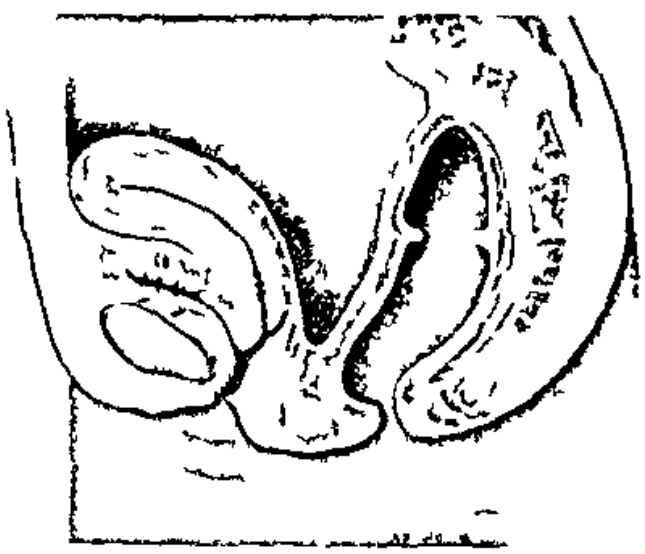
This case had passed entirely out of my mind when a number of years later I was asked by a physician in a neighboring town whether some thing could not be done to relieve a patient who had had her uterus fixed to the abdominal wall but whose cystocele a very troublesome one had not been cured When she asked her operator a prominent Boston surgeon if further relief could be had he replied that he had done all that was possible for her comfort She was 79 years old and under ordinary conditions probably might have been fairly comfortable as she was but he had to care for and lift an invalid husband and the bladder tumor was a serious inconvenience to say the least On examination I found the uterus in excellent position with the fundus securely anchored to the abdominal wall but there was a large protruding cystocele The result in my first case then came to mind and I suggested that this seemed an ideal case for such a method of suture The operation was performed and the symptomatic relief was perfect To use her own words I never would know I had a bladder She was able to care for her husband as long as he lived and her own relief continued I am informed up to the time of her death some years later

From that time down to the present I have used this method in practically all cases of cystocele whether or not associated with other varieties of prolapse After a number of operations had been performed I made a more careful dissection of the tissues beneath the meatus into





which the sutures uniting the cervix had been placed and discovered that I was employing the dense fibrous layer of the triangular ligament which passes below the urethra and then spread out fanwise to each pubic bone. I now dissect out this ligament in each case. It is extremely dense and firm and when grasped by the forceps it is almost impossible to move the patient by making traction upon it and that without disturbing in the least the meatus or the urethra. Of course this explains the absence of any interference with micturition while at the same time it affords an extremely firm anchorage for the cervix. If once the uterus becomes firmly adherent at this point it is safe to say that the uterine shelf will not give way. As a matter of fact there has not been a single case where the cystocele has recurred at least so far as I have learned. In two cases there was an imperfect union at the point where the rotten suture and the second resulting from a constitutional condition of the patient. However I think it proper to say that these do not affect the validity of the method as such. One of the cases just mentioned had a second operation which was successful while the other was so much relieved that she declined further interference.



In my former paper I restricted the probable utility of the operation to those cases especially in which the uterus had been fixed or suspended previously and in which there was no great amount of procidentia As a matter of practice however I have gradually learned that these restrictions are more or less unnecessary Naturally the best results surgically speaking have been those in which the uterus either had previously been fastened up or was fixed at the time of operation However in a considerable number of cases where it seemed unwise to open the abdomen the result as far as the cystocele was concerned has been entirely satisfactory Of course the presence of a rectocele which either was not entirely cured at the operation or which developed later on gave a certain amount of trouble However I have seen no special tendency for the secondary formation of a rectocele so that the presence of such a condition does not affect the standing of the new operation as a means of relieving the vesical prolapse or hernia

Two patients reported that there seemed to be something wrong at the site of the operation and they feared the sutures had given way Examination in one of them showed that what the patient felt was a very long anterior lip of the cervix It gave no discomfort however and she declined to have it shortened In the other case I did not cut away as much of the mucous membrane flaps as usual and after some months they had not retracted as they commonly do in the process of healing but hung down like dogs ears The patient had no symptoms but could feel these projections when bathing They were removed easily under local anæsthesia and the patient is happy once more

In one case I myself thought at first that the conditions had recurred but on careful examination found the uterus still adherent to the abdominal wall and the bladder still completely held up A soft elastic tumor in the vagina proved to be a true hernia which passed through a finger sized opening between the rectum and the uterus and completely filled the vagina It was tied off at the base by the vaginal route but there was no dense structure for the sutures In less than a year the hernia had recurred and this time I opened the abdomen and made a sort of second floor to the pelvis—a kind of double keel as it were—by suturing the cæcum and sigmoid together and both of these organs to the front wall of the pelvis just above the bladder This expedient which so far as I know is a novel one was suggested by the writings of Culbertson of Chicago who utilizes these portion of the bowel to cover large exposed surfaces in the pelvis This final operation was done several years ago and the new floor while somewhat soft and elastic has so far held up the overlying intestines

I have recently seen one case that is quite instructive The shelf operation was done 7 years ago in a very heavy woman of about 65 who had complete procidentia and who had an extreme amount of abdominal and omental fat She was doing heavy work with much climbing of stairs A surgeon to whom she went a few months ago during my illness told me that there was a large secondary abdominal hernia and that the cervix projected downward between the labia Either the uterus he thought had broken away from its attachment or was held only by a stretched out band He was of the opinion that the uterus had also broken away from the bladder He proposed a vaginal hysterectomy I was present at the operation which was done about 4 months ago The greater part of the projecting mass consisted of a very large rectocele with relaxation of the whole pelvic floor but the interesting point is that the cystocele had never recurred In fact the whole anterior surface of the uterus was so firmly attached to the bladder that they were separated with considerable difficulty Just what is the best thing to do under such conditions is a matter of opinion At any rate the cystocele had been cured She had been entirely comfortable for three years following her operation

In one case a rather unusual problem presented itself The patient had a marked cystocele but there was present a large uterus with multiple fibroids which evidently called for hysterectomy I first did a supravaginal hysterectomy then attached the cervix of the remaining stump to the triangular ligament in the usual way and finally implanted the round ligaments shortened as much as possible into the stump This manœuver obliterated the cystocele completely and the patient was permanently relieved

Naturally all my operations have been done on patients who had passed the childbearing period One would hardly dare to fix the cervix in this manner in an individual who might become pregnant and yet on thinking the matter over I am inclined to believe that such a uterus might go through to term and empty itself without undue risk to mother or child I shall not tempt fate by arranging such an affair but should such an unexpected pregnancy occur I should allow it to go on with a good hope of a successful termination

This would seem to be the case for the modifications suggested by Dr Cullen to [illegible] on See addendum at the end of paper

Now a few words as to the technique of the operation. The posterior lip of the cervix is grasped by a volsellum and the denudation is begun close down to the os the closer the better. If the cervix is infected much thickened or very long one I always amputate it. The mucous membrane is separated from the bladder by sharp dissecting scissors. Some operators think that there is danger of perforating the bladder by this cutting technique but if the tips of the scissors is kept pointed away from the bladder and close to the surface of the vaginal mucous membrane this could hardly happen. After pushing the scissors upward for an inch or so the flap is cut by the scissors in a line joining the cervix to the meatus. When we reach a point about an inch below the meatus care should be taken to avoid cutting the triangular ligament. The flaps are dissected from the bladder wall laterally by sponge dissection as far as seems desirable. In my earlier operations I carried this dissection farther than the side than I do now. The change was made for two reasons. In the first place experience has shown that it is unnecessary to make so very broad denudation and beside the further one goes laterally the greater is the number of large veins he is apt to encounter which may be torn causing trouble some bleeding. The excess amount of flap is then cut away on each side. How much shall be removed is a matter of judgment. Usually the flaps retract into the vagina as healing progresses and cause no trouble but in case as I have just reported I left so much tissue that it bothered the patient and it was removed.

The sutures are started by passing a No 2 or No 3 chromic catgut from above downward through the triangular ligament then through the cervical tissue transversely close down at the os and again through the ligament from below upward. I usually put in two such sutures. Very likely these alone would be sufficient to hold the tissues in place until firmly adherent but I never have trusted to the catgut alone except in the one instance already reported in which it was the only suture material at hand. Unfortunately it proved to be quite rotten and gave way within 24 hours. I next place one or two sutures of silkworm gut starting in this case just below and to one side of the meatus but this time going through the mucous membrane so that the knots after they are tied will be accessible. It will be seen that the catgut sutures are buried while the silkworm comes to the surface just below the meatus. The ends of the silkworm are cut long and rarely cause any irritation. I have usually sent the patient home with these sutures in place and have had her come back for their removal from 6 to 8 weeks afterward. So long a time may be unnecessary but at least it is a safeguard against possible early separation at the line of suture.

The flaps are now trimmed if this has not already been done and interrupted chromic catgut sutures applied. This line of sutures run transversely to the axis of the vagina. In most cases I have found it necessary to do a very thorough plastic operation on the perineum and frequently an associated rectocele requires special attention. A strip of iodoform gauze is left in the vagina after which the abdomen is opened and it is a case of uterine fixation.

I will not give an account of the individual patients as their symptoms were much alike but will simply summarize the results obtained.

The ages of the patients traced ranged from 43 to 79 with an average of about 63 years. The length of time during which patients have suffered ranged from 1 to 45 years an average of 10 years. Thirty six (70 per cent) reported themselves entirely well. Two stated that they were relieved. Two reported that they had found no relief. (Neither of these latter returned for examination and the reason why their symptoms persist is unknown. Their persistent discomfort may have been caused by some other condition than the cystocele but I give them the benefit of the doubt.) We have then symptomatic cure in 90 per cent of the cases symptomatic relief in 95 per cent no relief in 5 per cent. There was no mortality.

So much has been said during the past few years of the importance of following up cases to distinguish between what may be called anatomical or surgical cure and symptomatic cure or absence of symptoms that I will quote a few of the statements voluntarily made in the reports received to show how satisfactory the results have been at least in selected cases. Some statements were so enthusiastic that they sound like a patent medicine advertisement and I forbear to reproduce them.

Mrs W. [illegible] suffered fourteen years and had had to wear [illegible] constantly. Was troubled all the time. Feeling [illegible] the time.

Mrs B. [illegible] suffered [illegible] years. Has felt [illegible] of relief and has not been troubled at all since operation.

Mrs I. W. [illegible] very much [illegible] condition. Cannot myself [illegible] have been.

Mrs I. had been troubled 45 years. Suffered so that she [illegible] from [illegible] operation but a child. She says: "Nearly entirely well except when [illegible] great deal [illegible] the time [illegible] the right [illegible] She has [illegible] symptoms from a [illegible] but needs [illegible] and considers herself well [illegible]

Mrs T 20 years du ation Can now work or walk witho t getting m ch ti ed and ha e no backache what ever

Mrs S Just before oper t on could not be on her feet Now able to do all my housework and walk around with all comfort

Mrs B 15 y ars Compl te reli f

Mrs M B wore support for 12 years Se e ty s x y ars old at oper t Now perfectly well

CONCLU ION

I rom my observations of these cases and the results reported I think we may conclude

1 That the operation as described is a safe one

2 That the bladder supported by the uterus as a shelf is permanently retained in its cor rected position

3 That the symptoms whether due to the dragging down or to the irritation of the bladder are completely relieved in at least 95 per cent of the cases

4 That the best results are obtained as would naturally be supposed when the uterus is sup ported by some sort of intra abdominal operation

5 That a thorough repair of a torn or relaxed perineum and any complicating rectocele is quite essential

6 That a large measure of relief can be ex pected even in those cases in which the condi tion of the patient does not warrant opening the abdomen

7 That the fixation of the uterus as described not only does not in itself produce any discomfort but many patients have an unexpected feeling of well being

8 That advanced age seems no bar to the operation

Addend m Since the above paper was presented Dr Fred C Cotton of Boston in a personal communication has described an inte esting and v l abl modification of the ope ation as described By his permission a brief out line of his case is gi en here The pat t an elderly wo man prese t d a ery l rge globular cystocele behind which was nearly hidde a e y small cervix The uteru much trophied was st etched out to the length of nearly 6 inches Aft denuding the cystocele i the manner l eady d scribed he did a aginal hysterectomy and afte sewing the edges f the broad ligaments together he brought the upper edge of the ligament now united into ingle ba d do n under the cystocele and attached it curely to the tri gula ligament The flaps dissect d f m the cystocele were now s tured in place with little or no trimming to form the anterior vaginal wall The result anatomically was entirely satisf ct ry and the reli f com plete By thi techn q e the broad li am t becomes a r al helf upon whi h the bladder rests Should further xperi ce confirm the good result obtained in thi case as I beli it will this would seem to be the ideal operat n especially ad pted for tho e cases in which the uterus is th seat of path logy r in wh ch it seems unwise f r wh t e reason t pen the abd men abo e the pubes

A HYDROSTATIC REPOSITION FOR PROLAPSE OF THE UMBILICAL CORD[1]

BY DAVID MONASH, M.D., F.A.C.S., CHICAGO
Assistant Obstetrician, Cook County Hospital

ABOUT a year ago I had an urgent request to see a patient who had a prolapse of the cord and was in the first stage of labor. The cervix was well effaced and dilated to 4 or 5 centimeters. A loop of the pulsating cord was lying below the head. The patient had been placed in the usual knee-chest position which had been maintained for three quarters of an hour. After a thorough aseptic preparation an attempt at manual reposition was made. In the inverted position the head receded all along the introduction of the fingers and the cord was carried well above the lower zone of compression by the hand. As the fingers were withdrawn the head was supported and pressed into the lower uterine segment the patient at the same time assuming the elevated lateral prone position. It was soon evident from the fetal heart sound that our apparently successful reposition had not succeeded. Vaginal examination revealed a fresh prolapse. A second attempt to return the cord and keep it over a projecting small part failed. At the moment no instruments for reposition were obtainable. After manual dilatation of the cervix the hand was introduced and version followed by immediate extraction relieved the patient and rescued the child from impending danger. The cervix was torn, the child had to be resuscitated. During that hour of anxiety, effort and failure both the attending physician and I felt keenly the great need at hand of some simple and efficient means of reposition and retention of the prolapsed cord when the accident occurs in the first stage of labor.

After this experience I determined to study the subject of reposition and the causes of prolapse of the cord after reposition by the various instrumental and manual means as they obtain today. A critical survey of the literature on this subject presents a dreary chapter of ineffectual effort and experience among obstetricians in many countries with practically no advance in diminishing the high fetal mortality that still accompanies this accident.

All authorities agree the high fetal mortality in cord prolapse particularly in the first stage of labor estimated by some as high as 80 per cent in the untreated cases while in those cases where operation are undertaken to rescue the child the fetal mortality is reduced to 40 or 50 per cent. Prolapse of the umbilical cord, says Williams, must be regarded as one of the most frequent causes of fetal death in spontaneous labor in contracted pelves. He states that change to the methods in the operative procedures which are often required for the reposition of the cord such as version and rapid extraction.

In a case of air embolism reported at a recent meeting of the Chicago Gynecological Society the mother's death followed reposition of the prolapsed cord by the accoucheur's hand.

The prognosis for the child is determined by many conditions, the stage of labor, the fetal presentation and position, the degree of cervical dilatation, the amount of cord prolapsed and the gravity of the abnormality causing the prolapse. The risk to the child is increased in breech presentation, contracted pelvis, unbalanced cervix and prematurity. Prolapse in itself does not affect the mother but the treatment instituted to rescue the baby may endanger the mother through trauma, sepsis, hemorrhage and air embolism. With successful reposition and retention of the cord in the uterine cavity the immediate and ultimate satisfaction and the subsequent conduct of the labor is manifestly that indicated before the prolapse occurred. The one indication for treatment is to relieve the cord from pressure. The treatment instituted is dependent in a large measure upon the condition of the cervix. Prolapse during the first stage of labor yields the larger percentage of fetal death. Either by gravity—postural treatment knee-chest Trendelenburg or elevated Sims—by hand or instrument the cord must be replaced above the zone of compression. Retention by all of these methods is more or less difficult to effect and frequently disappointing. The literature records much ingenuity displayed in the various contrivance and instrument hurriedly improvised to meet the emergency. The list includes a piece of sponge, a fish gut, an inflated rubber pessary, a rod of gutta percha, a piece of whalebone, drill with hooks to which the cord is attached and many types of metal instruments more or less dangerous have been invented and discarded. While the text books are replete with the oft repeated advice to make a repositor out of a catheter and

[1] Read before the Section on Obstetrics and Gynecology at the Sixty-ninth Annual Session of the American Medical Association, Atlantic City, June, 1918.

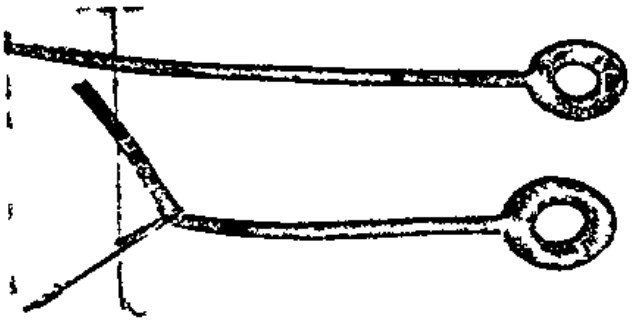


Fig. 1.—Photograph of the instrument collapsed and distended.

stilette as of the Braun type there is not a cord repositor at present in any armamentarium that I have had occasion to investigate in any of the most modernly equipped maternity hospitals in Chicago nor is there any other instrument provided for the emergency. Indeed the proper type of catheter or bougie and stilette is not easily obtainable nor is the knowledge of assembling the parts and their use as a repositor at hand.

The requirements for a self retaining repositor are that it should easily and safely engage the cord be easy of introduction be retained with the cord above the presenting part and not interfere with the engagement of the head and spontaneous labor.

Description of the repositor (Fig. 1).—This repositor devised in the hope of fulfilling some of these requirements is made of fabric reinforced rubber and consists of a hollow elliptical ring and a long tail tube. On one side of the oval is a small pocket to facilitate introduction. The outside measurements of the oval are 8 by 6 centimeters the central opening being 2 centimeters less in all diameters. The tube is 45 centimeters long. The fluid capacity at full distention is about 40 cubic centimeters. Distended the repositor withstands a pressure of 300 milligrams mercury which is far above the compressor points of a uterine contraction (Schatz).

Method of introduction.—With the patient in the usual position with the pelvis well elevated the *first step* in reposition of a pulsating cord is to introduce the flat collapsed repositor into the vagina and with the fingers or forceps draw the prolapsed loop through the opening in the oval (Fig. 2).

Then directed by the internal fingers the tip of the uterine sound or uterine forceps enters the pocket on the oval or the upper part of the oval is grasped by the forceps and the *second step* is the carrying of the repositor and engaged loop into the uterine cavity above the presenting part.

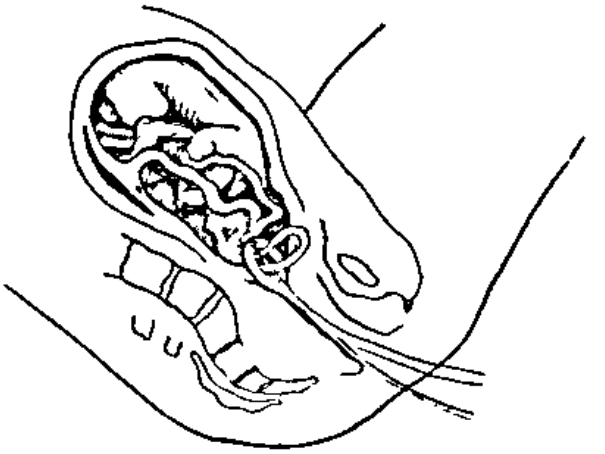


Fig. 2.—The prolapsed cord is drawn through the repositor. The tip of the uterine probe is engaged in the repositor pocket.

The *third step* (Fig. 4) constitutes the distention of the repositor with sterile water and tying or clamping the tube. The probe or forceps is now removed and the distended repositor with the trapped cord remains in the space between the small parts and the uterine wall.

The tube when fully distended is still pliable and offers no resistance to the advancing head. The distended repositor with the loop of the cord within has the virtue of mass formation providing a point of fixation similar to that of a small part upon which the cord can be looped. This is further augmented by the crossing of the planes of the distended repositor and the retained loop. The success recorded in several instances in which repositors were improvised out of a piece of sponge or folds of gauze was apparently due to this mass immobilization. These are important factors in self retention. Failure in manual reposition is indeed caused by this very lack of fixation *en masse* for the mobile loop of the cord if not carried over a small part of the fetus follows the pathway of the withdrawing fingers and is expressed before the head can occlude the lower uterine segment. Again in the use of the catheter and stilette the withdrawal of the instrument offers a prompt return of the prolapse. Therefore all authors advise that the catheter be allowed to remain in position in the hope of cord retention.

No metal or other stiffening substance is incorporated in the rubber repositor first because it is desirable to avoid the danger of injuring the uterine wall placenta or child and second because the collapsed repositor is more easily introduced through the undilated cervix and when distended is sufficiently rigid for safe retention within the uterus.

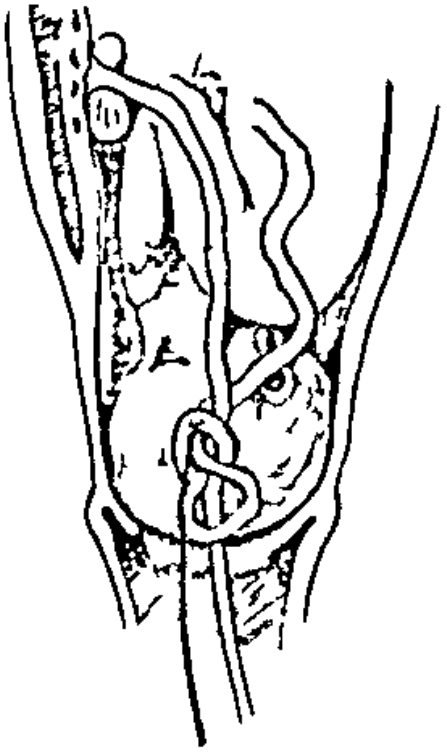


Fig. 3. The repositor before being tried out.

In the experimental work done in part in the physiological laboratory of Northwestern University with the counsel and aid of Dr. Drag felt the question of kinking and compression of the cord by the repositor both collapsed and distended was investigated. Simulating intra uterine conditions as closely as possible and under varying degrees of angulation and compression the patency of the cord vessels was established by the passage of injected fluids.

In the cases where the repositor was tried out in an experimental way in the Chicago Lying In Hospital the instrument was retained despite adverse conditions. The first was not a case of prolapse of the cord but of a fetus dead four or five days. The instrument was placed into the uterus well above the presenting part and the

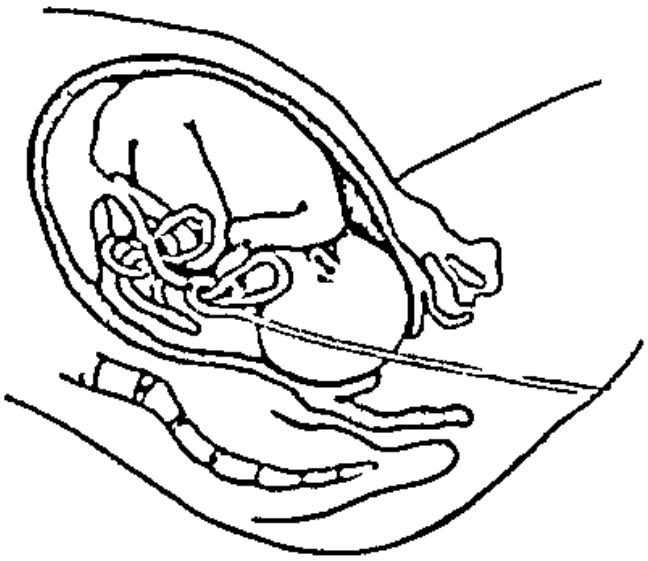


Fig. 4. The repositor with the loop of cord less than the small part. The repositor is distended with water in the uterine cavity.

internal cranioclasty. Despite all the manipulations necessitated by the operation the distended repositor remained above the head and when the fetus was extracted it came out alongside the feet. The second case was a multipara who entered the hospital with a history of five and one-half months pregnancy and a prolapse of the cord for ten hours. There were feeble pulsations in the cord which was prolapsed externally. The cervix was dilated to 2.5 centimeters and thick. The hydrostatic repositor was used and the loop prolapsed loop thoroughly disinfected was easily returned into the uterine cavity. A 6-centimeter Voorhees bag was then passed into the cervix. Eight hours later the bag and fetus were expressed. The cord and repositor were retained until the fetus was born.

In the hope of reducing the high fetal mortality due to the accident of cord prolapse and also in the hope of providing the obstetrician with a serviceable self retaining repositor this instrument is presented for trial.

EDITORIALS

SURGERY GYNECOLOGY AND OBSTETRICS

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JULY 1924

SPINAL CORD TUMORS

SIR VICTOR HORSLEY in 1887 successfully removed the first spinal cord tumor and it was not until then that the surgical profession believed it possible to remove such lesions Since then the number of spinal cord tumors localized and removed has steadily increased It has always been the general impression that spastic paraplegia is due to some form of sclerosis syphilis or myelitis and the treatment has been either expectant or antisyphilitic

The history of a patient suffering from spinal cord tumor is more or less characteristic in that the patient complains either of a progressive loss of tactile pain and temperature sensibilities or loss of motor function the progress of the symptoms depends on the location of the neoplasm If the tumor is situated dorsally sensory disturbance will be the first symptom if anteriorly the first complaint will be one of motor disturbance and if laterally anterolaterally or dorsolaterally a combination of symptoms sensory and motor will develop commonly known as the Brown Sequard syndrome Root pain is usually present because of traction on the sensory root and patients are seen with this complaint who have had various operations for abdominal lesions without relief there are however cases in which the tumor develops without root pain Disturbances of the rectum and bladder occur late in the course of the disease unless the lesion is an intramedullary tumor

The history of spinal cord tumors differs from that of sclerosis in that a definite level of either sensory or motor disturbance below a given segment appears whereas in sclerosis there are numerous areas throughout the cord or in the brain where the symptoms are manifested The history of cord tumors also differs from that of myelitis in the latter disease there is usually a rapid and quite complete history of infectious myelitis within a few days or a week following the onset of the trouble In chronic meningomyelitis however the symptoms simulate those of cord tumor

The patient with spinal cord tumor has a loss of reflexes at the level of the tumor and increased reflexes below the segment involved Aside from the importance of obtaining a complete history of the case several tests are of value Spinal puncture findings usually show an increase in the globulin and occasionally the fluid is yellow in appearance due to xanthochromia which is significant but not pathognomonic A block in the flow of the cerebrospinal fluid in the spinal canal is significant as it is more often caused by cord tumor than by adhesive arachnoiditis The differential pressure in the cerebrospinal fluid between the posterior cistern and the fourth lumbar interspace brought out by Ayer is valuable

in determining a total or partial block in the flow of the cerebrospinal fluid Pneumography of the subarachnoid space of the spinal canal originated by Dandy consists of diagnostic injection into the subarachnoid space of the spinal canal for radiography developed by Sicard is also valuable in diagnosis and localization While all of these special tests are of value in determining localization they do not supersede a thorough neurologic examination and should be used only when it is otherwise impossible to determine the exact level of the lesion

Spinal cord tumors differ from brain tumors so far as the possibility of removal is concerned in that 60 per cent or more of spinal cord growths are encapsulated removable neoplasms such as the meningiomata fibromata psammomata and neurofibromata the remaining percentage of such lesions consisting of intramedullary gliomata extradural fibrochondromata sarcomata and metastatic tumors The tumor which can be totally removed is the subdural but extramedullary tumor the growth which produces direct pressure

The operation generally employed is the laterallaminectomy over the segment involved unless the operative field is in the cervical region in which case a unilateral laminectomy may be sufficient to expose the tumor While general anesthesia has been commonly used the paravertebral block anesthetic has proved of great value because of the greatly diminished bleeding and the lessened surgical shock The postoperative care is ordinarily like that given in general surgical cases except in cases in which there is involvement of the bladder which demand special attention as will pyelitis and pyelonephritis

When the results following removal of spinal cord tumors are compared with those following operation for malignancies of the cardia stomach or colon one cannot help being impressed with the possibilities of surgical treatment in these cases as 60 per cent of all spinal cord tumors exposed at the time of laminectomy are removable which means complete and permanent recovery if the case is diagnosed sufficiently early A W Adson

THE VALUE OF RADIUM AND X-RAY IN THE TREATMENT OF MALIGNANT DISEASE

OPINIONS on many subjects in surgery vary markedly among surgeons of the widest experience because each one is obliged to draw his conclusions from his own individual experience which necessarily differs more or less from that of every other surgeon Especially is this true in general in method of treatment and in electing a particular method to be applied in an individual case The experience the prejudices or the resources of one clinic determine the election of a specific method whereas variant conditions in another clinic will result in the adoption of an entirely different procedure Because of this a comparison of the results in these two clinics is obviously impossible

The difficulty is probably more manifest in reaching a just conclusion in regard to the value of X-ray and radium in the treatment of malignant diseases than in any other subject in surgery Undoubtedly some advocates of radiotherapy have been injudicious in many cases in which marked benefit was obtained by radiation have been published as cures at periods considerably less than the 3 years generally accepted in surgical literature and often unsupported by pathologic evidence of malignancy If judged by these reports many surgeons continue to employ the operative measure with which they are familiar and do not trouble to determine if

first hand the value of radiation either alone or in combination with surgery

The American Surgical Association first recognized the growing need for a just and critical review of the various methods for the treatment of malignant diseases and in February 1922 by mutual understanding the American College of Surgeons appointed the committee to make the investigation as the problem is one peculiarly suited to its organization and of such character as amply to justify the employment of its resources

Carcinoma of the cervix uteri was selected by the committee as the most important subject for immediate study Complete and uniform case records were secured of all such cases admitted to the wards of the twenty two clinics concerned in the investigation and from the mass of material thus collected a preliminary report (see pages 18 to 26) has been prepared and such conclusions drawn as seem to be justified by the fact presented It is to be noted that the statistical results have been subjected to the mathematical corrections commonly used by statisticians in making allowance for the numerical variations due purely to chance a method not usual in medical and surgical reports

It is the purpose of the committee to continue the collection of data to extend the three year time limit to five years and even longer and to publish further supplementary reports which will include the details of operative treatment as well as the technique of radiotherapy employed Similar investigations are also under way in cancer of the breast and of the mouth and tongue and the value of radiotherapy in these and other forms of cancer will be made the subject of subsequent reports

It is believed that the findings of the committee will be of interest and value not only to the individual Fellow of the College but as well to the whole science of surgery

THE JUNIOR CANDIDATE

THE American College of Surgeons is performing a very definite duty in looking well to the future One of the greatest statesmen who ever lived was responsible for the saying Where there is no vision the people perish

The establishment of the Junior Candidate Group in the College of Surgeons is not a means of shaking the bushes to secure a larger membership in the organization but rather an effort on the part of the College to render a very real service to the younger men who will be the surgeons in the years to come

As has been already stated many times the junior candidate is not a member of the American College of Surgeons in any sense of the word He is but a candidate for Fellowship and is not eligible to be considered for membership in the College until at least seven years after graduation It is the earnest desire of the College to assist these young men both ethically and professionally in the earlier years of their development Each junior candidate must be well recommended and approved by his respective Credentials Committee He must also take the oath and declaration against fee splitting and other unethical practices Year by year the junior candidates list will be carefully reviewed by the Credential Committees The name of any candidate may be removed at any time for sufficient reason

This junior candidate movement is a policy of service both to the profession and the public It is full of possibilities for the future development of practical scientific surgery Its full value will be realized year by year in the unfolding of the future

Details of the plan for the organization of a Junior Candidate Group may be found on pages 126 to 127 of this issue

MASTER SURGEONS OF AMERICA

HENRY JACOB BIGELOW

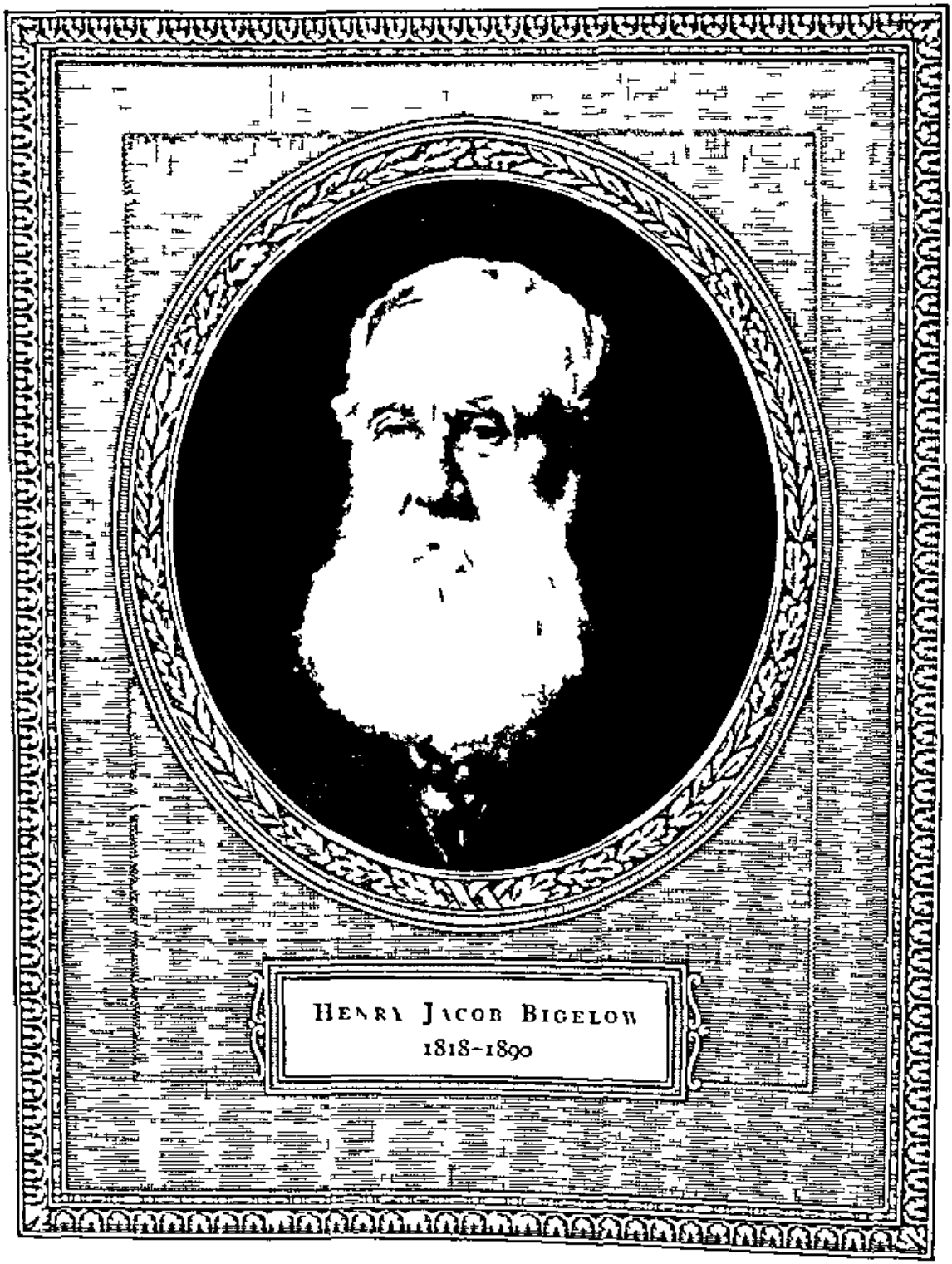
HENRY Jacob Bigelow was born in Boston Massachusetts March 11 1818 He was the son of Dr Jacob Bigelow and his wife Mary Scollay Bigelow

The senior Bigelow (1787–1879) was the third of that name in lineal succession and he came from old New England stock Graduating from Harvard in 1806 he received his degree of Doctor of Medicine from the University of Pennsylvania in 1810 For nearly 50 years thereafter he was Professor of Materia Medica in the Medical School of Harvard University and also for a long period Rumford Professor of the Application of Science to the Useful Arts in the Academic Department of the same University He was president of the American Academy of Arts and Sciences from 1846 to 1863 and a member of other prominent associations in this country and abroad He was the author of many botanical and medical works of value and of addresses and essays on educational and kindred subjects He conducted a large medical practice in Boston and he was highly esteemed for his virtues and for his wisdom The wife of Dr Jacob Bigelow has been described as possessing in addition to her womanly virtues and gentle nature great strength of character For those who believe in the hereditary transmission of unusual qualities this sketch concerning the parents of the subject of this memoir may be of interest

After preparation at the Boston Latin School young Bigelow entered Harvard College and graduated in the class of 1837 Associates of his youth have testified that even at that period of his life he gave evidence in many directions of marked ability both physical and mental

He began his medical education with his father and later he was house surgeon in the Massachusetts General Hospital After this he sailed for Europe coming home to receive his medical degree (in 1841) but returning soon again to Europe to continue his studies He spent three years there principally in Paris crossing the channel frequently to attend the lectures of Sir James Paget in London for an intense interest in surgical pathology gross and microscopic manifested itself early

On returning to America he was made instructor in surgery in the Tremont Medical School succeeding Dr Reynolds This school was finally united to the



HENRY JACOB BIGELOW
1818–1890

Medical School of Harvard University in which in 1849 he was appointed professor of surgery

Coming fresh from Europe saturated with what were then the latest medical and surgical ideas he became at once a prominent figure in his chosen profession In 1846 he was appointed surgeon to the Massachusetts General Hospital and about this time his long career of professional activities and usefulness which included many contributions to the advancement of surgery began Within a few months after he received his appointment to the Hospital the anæsthetic effect of ether inhalation was successfully demonstrated there by Dr William T G Morton on one of Dr J C Warren s patients and Dr Bigelow recognizing at once that the anæsthesia was safe certain and complete and realizing with almost prophetic appreciation its enormous usefulness to the human race took steps forthwith to announce to the world the great discovery and to champion its cause the result being that the use of ether as a means of producing unconsciousness during surgical operations was adopted far and wide It has been said Dr Bigelow s own aversion to giving pain must often have caused him to look back with peculiar pleasure upon his share in alleviating surgical suffering

On May 8 1847 Dr Bigelow was married to Susan daughter of Hon William Sturgis of Boston She died however in 1853 leaving an infant son who born in 1850 is now Dr William Sturgis Bigelow of Boston

A persistent *investigator* of surgical problems Dr Bigelow directed upon them the full force of his extraordinary powers of scientific analysis and his intuitive knowledge of applied mechanics

His first important investigation upon which he spent a number of years (1861–1869) was upon dislocation of the hip It was while studying the mechanics of this injury that he discovered and described the iliofemoral (the Y) ligament and saw clearly the significance of the control which it exercises over the head of the femur during and after dislocation He saw clearly how he could utilize this control in causing by manipulation alone the displaced head of the bone to return to its socket along the same route it had travelled during the act of dislocation His advocacy of this intelligent method of reduction in place of the complicated painful and unsuccessful method of horizontal traction by ropes and pulleys which inherited from England had been hitherto in vogue marked a long step in advance in the treatment of hip dislocations and the publication of these facts was sufficient alone to entitle Dr Bigelow s name to a prominent position in the history of surgery

Dr Bigelow s analytical and practical mind was applied to many other problems connected with surgery and surgical practice and it really seemed that every subject he touched was bound to be elucidated the result of his work marking a definite advance in that line It is probably fair to say that no surgeon

of his time at least in New England made so many contributions to surgery or introduced so many improvements as Dr Bigelow

The result of his investigations in the operative treatment of stone in the bladder was hardly secondary in importance to his work on hip dislocation and it gave him a world wide reputation In those days lithotomy had a far higher mortality rate than it has today and while there was some difference of opinion as to the relative merits between lithotomy and lithotrity the latter operation was usually preferred when in any given case it actually came to a choice Dr Bigelow however was so much impressed with the high mortality following the crushing operation that he studied the matter with great care and finally reached the conclusion that this high rate was not due to instrumentation but rather to the presence in the bladder after each operative sitting of sharp and angular fragments of stone resulting in direct injury to the walls of the bladder and to a dangerous cystitis not to speak of the inevitable pain and suffering for the patient This was a most important discovery and constituted a real intellectual triumph! He therefore concluded that the stone or stones should be removed *at one operation* for by this procedure the bladder walls would not be damaged by the stony fragments left after the operation and infection would not be so apt to follow

Having demonstrated the tolerance of the bladder for prolonged instrumental interference he devised a method for removing the stone or stones at one operation after they had been crushed into small fragments by the lithotrite This was done by alternately flushing the bladder with water through a large urethral tube —generally a straight one—and then partially emptying it again To the tube was attached a capacious rubber bulb with a catch basin to receive the fragments removed from the bladder with the outgoing stream He gave the name of lithola paxy to this operation a procedure which became in those days the best operative treatment available for these troublesome cases and one which still has its advocates He spent years in studying the detail of this operation during which he perfected the necessary instruments which I believe are in use today

The publication of this operation developed sharp criticism in this country and in Europe assertions being made that his method had already been used by others and further that it was questionable whether after all they represented a real advance over those of the old operation The controversy raged for years until finally Dr Bigelow was invited to open a discussion at the International Medical Congress which took place in London in 1881 [1] After twice declining this invitation he finally accepted it and his ingenious method of demonstrating the operation by means of an artificial bladder was so convincing that his methods were generally accepted as representing a genuine and important contribution to surgery In a private letter to Dr Bigelow John Eric Ericksen

[1] Bigelow H J Modern Lithotrity Trans Int Med Cong London 1881 1 pp 96 106

president of the Surgical Section wrote Your operation is the first real advance in the treatment of stone since Civiale perfected his system of lithotrity

As a *reader* Dr Bigelow was not omnivorous and yet when seeking information especially along lines of his investigation he would as Dr Oliver Wendell Holmes said of him get what he wanted out of a book as dexterously as neatly as quickly as a rodent will get the meat of a nut out of its shell and also in referring to his originality that he took life at first hand and not filtered through alphabets

As a *writer* his publications were not numerous but they seldom failed to add something new and useful to the surgical information and practice of the day No article written by him failed to excite attention and the marked interest in his writings on surgical practice especially in New England was far reaching

As a *teacher* he was pre eminent His dignified impressive personality his concise and forceful language his humor his wit his interesting and picturesque illustrations never failed to make their deep and lasting impressions on the students who crowded his clinics He had in a marked degree the ability of impressing his students with just the information he wished them to remember Dr Reginald Fitz said of him that his lectures were models of condensed thought and applied knowledge

He was professor of surgery and professor of surgery emeritus for more than 40 years So great was his influence it might almost be said that during his professional career he founded in New England *a school of surgery* and the effect of his teachings is felt here today even by surgeons who had not the privilege of attending his lectures Tall handsome magnetic and commanding compelling respect and attention he was a natural teacher and a leader of men and he impressed his personality upon everyone with whom he came in contact

As an *operator* he was calm and self possessed with quickness of observation and decision and with great manual dexterity and grace although it goes without saying that the rapid operating which conditions in those days seemed to require and the imperfect asepsis then in use would hardly meet with approval today Dr David W Cheever said of him that to see him operate was to recognize a master

It is but natural however that in spite of his remarkable insight into surgical problems and his numerous achievements resulting from it he should toward the end of his life have failed to foresee the extraordinary results which were to follow the development of the antiseptic system He was at this time rather inclined to look askance at many of the new operations and even to consider them unjustifiable If this revolution in operative method had come earlier in his career when his powers were at their height he would probably have seen more clearly

The sphere of Dr Bigelow s activities outside of surgery was a very broad one Lack of space prevents even the enumeration of the many subjects upon which his careful attention was directed during his life He was always original and his mind seemed ever on the search for possibilities of improvement He left his mark of genius upon everything he touched

In addition to his other gifts Dr Bigelow was a highly cultured person and being most favorably placed as to social environment he improved his opportunities to become familiar with all that is best in the fine arts He was a regular attendant at the Boston Symphony Concerts and he was for many years an influential member of the Board of Trustees of the Boston Museum of Fine Arts

He resigned his professorship in the Harvard Medical School in 1882 and his position as surgeon at the Massachusetts General Hospital in 1886 to both of which institutions he had rendered eminent service After retiring from his professional activities he led a quiet life at his country home in Newton Massachusetts until his death October 30 1890 at the age of 72 years

GEORGE H MONKS

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD JANUARY 18 1924 DR CHARLES S BACON PRESIDING

PRESENTATION OF ROENTGENOGRAMS (1) ENLARGED THYMUS IN NEWBORN (2) PRIMARY BROW AND FACE ATTITUDE BREECH PRESENTATION (3) FLAT PELVIS—NO OVERRIDING OF HEAD ON PUBIS (4) CONGENITAL SYPHILIS AND NORMAL CHILD (5 6 7 8) FORCEPS APPLIED WHILE LABOR PROGRESSES (9) TWIN LABOR

DR J B DELEE I have a few X ray plates which I would like to show The first is that of an enlarged thymus in the newborn The baby was delivered without any particular trouble but could not be gotten to breathe A tracheal catheter was inserted and passed down almost to the base of the lung showing *that the passage of the trachea was free* In spite of that we could not get the baby to breathe The child lived two and a half hours At postmortem the thymus weighed 29 grams I believe there is something that prevents life from being established in these babies other than mechanical obstruction from an enlarged thymus

The second plate is also from the Irving in Hospital It shows a primary brow or face attitude but it was a breech presentation and this picture was taken a month before the baby was born The baby occupied this position throughout pregnancy The woman had a contracted pelvis and I tried very hard to rotate the body so as to bring the head down over the inlet I tried five different times but was unsuccessful I delivered her by low cæsarean section The baby still holds its head up in that way and the face is flattened The point in that picture is the peculiar attitude It also shows that a breech presentation cannot always be changed to a head The reason in this case was a unicornous uterus

The third picture shows a woman with slightly flat pelvis in which you would think there was an overriding of the head on the pubis but there was not There was a little lateroflexion probably the marks of obliquity of Naegele This case was terminated by forceps after natural and easy engagement of the head

The fourth is a case of congenital syphilis The baby when only a few days old showed the marked evidence of syphilis There is a wide thickening of the bones especially in the heads of the tibia and fibula The mother has a positive Wassermann 4+ For comparison I show you here an X ray picture of a normal baby

The fifth is a picture taken of a woman in labor with the forceps applied We delivered her on the X ray table I show it to you to demonstrate how the head lengthens in the grasp of the forceps There was slight movement of the head at the time the picture was taken The next picture shows the forceps moved and the baby's head distending the vulva You see the immense displacement of the soft parts around the head It also shows the molding of the head with overlapping of the bones *There* is one point of scientific importance in the mechanism of labor Sellheim declares the clavicles *are vertical and we often find them so during* delivery Here they are transverse The next picture shows the head delivered and the soft parts retracted around the neck This picture is intended to show how the ribs are pinned down with a very great compression of the chest When the compression of the chest is released breathing is established as the expansion draws in air

The last picture shows a twin labor The second child was delivered first

TWO CASES RELATING TO THE THEORY OF THE CORPUS LUTEUM

DR RAYMOND H MCPHERRON Possibly with the exception of the phenomenon of *consciousness* there is no fact of life that excites more interest and seems to offer *greater difficulty* in arriving at any definite conclusions than the function of reproduction Thus Howell prefixes *the chapter* on reproduction in his work on physiology and I believe that most of the younger *men at least will* agree with him readily

One of the angles of *the question* that has received its share of research and observation has been the corpus luteum *It may* seem a bit presumptious to attempt to draw any conclusions from two cases but I believe *that* even among those men doing extensive work in gynecology the actual observation of *corpus luteum* verum is relatively rare

The two cases that I have to report were operated upon by *different* operators at the Post Graduate Hospital

CASE 1 *Mrs O T* age 26 said the menses began at 14 and were regular every 4 weeks moderate in

vanced in the last twenty years This is certainl an a l ition to the obstetrical armamentar um an l I l el eve it is a goo l thing In f ct I am illing to try it at the fr t opportunity It looks to me as though it would w rk I am gla l that we are im proving along that line

RUPTURED UTERUS REPORT OF FOUR CASES

Dr David S Hill presente l a paper entitl l Rupture l Uteru Rep rt of Four t (See p 32)

DISCUSSION

Dr J B DeLee The admi n of four cases of rup ture l uteri to one hospit l in a few m nths shoul l be enough to convince t th ne ess ity of an investigation int any m thod of c ar an sect n which offers at least a prom e of re fucti n in th number of these c ses A u know I have been very muc l interest l in t l e been trying to get the members f the Gyn col g cal Society to p r ctice the l w ca sarean s ction I be lieve that the p r entat n of Dr Hill deserves the earnest attenti n of th S iety If w nt to give these women wh h e l l a sarean sect n the full benef t of our art the mu t ive in the hospit l after the sev nth m nth The l w cervi al casarean secti n does give s me pe th r gard I have seen a few ca es which [ov th t e are justified in the h [e we [h e on it In ul qu nt ca areans the scars ha will bo l test l l Lor In continental cl nic xp rience justifies th stat m nt that ruptur of th scar fr m n se tion performed in the lower part f the teru i mu h r rer than from that perf me l in the upp e part Thousan ls f these low casarean secti ns ha been perf rmed and nly th ee rupture h been re ported Wh n an operati n t trug g n a foot hol l an l trying to rep lac an ther perati n if the ba l results are goi g to be reported s n only thr e have been reporte l I think we re ju tifie l n saying that low ca ar n t n loes pr ent th occurrence of these acci ents

Dr Eugene Cary I would like to l th r ca e to those in Dr Hill's paper La t th m nth I op rated on a pat ent who ha l ha l a sar e n section previously at the County Hospit l She came into the hospital with a ma kedly co tracte l pelvis an l in r ther active labor Th membranes had rupture l an l she w s prep red immedi atel f r operation We got along without any tr ul l up to the time the abdomen was open d W was our custom after e erything wa ready t open th uterus we gave pituitrin W ga e on mi ul and as we made ready to open the ut us e noti ed a scar about five inches long in the ut rin w ll W I put down the knife to open th scar it f rst part and the fetus was extru le l into the ope ati f eld I think if that patient l d be n allow l t nt nue in labor or if the membran s had not ruptured allowing the uterus to contract she would have had a rupture before operation

Dr Arthur H Curtis At the recent meeting of the American Gynecolo cal Society Williams reporte l a very large series of casarean section operati ns in which there ha l been a rupture at the f l owing pregnancy In no instance was there a tear of the uterus through the scar May I ask whether it w possible to obtain a his ory of pos operative infection at the first operatio n these cases

Dr David S Hillis (closing) In answer to Dr Curtis two of the cases sho ed evidence of in ection and two ha l not been infected

The question of the cur re n section scar is a m st important one from the standpoint of sub quent labor We oul l like to k ow when it n s fe to allow a patient to try a labor after she has ha l a casarean section If we dec de on the basis of previous h tory with re erence to infection we may be wrong We cann t examine the scar be re the pati nt is d li ered and there is no way known to determ n wh ther a gi en scar will ho l or not I *sho wed a case before this society* a year or two ago m wh ch the uteru ha l rupture l and the scar remained intact I have l ne a second casarian sectio on many es an l foun l the scar in such con tion th t I bel eved it ould have been tru ted in a secon l l bor Here are f ur cases in wh ch the scar could n t tar l th strai t incident to pregnancy m ch les the tra ma of labor At the County Hospital we have liv red cases which ha l a previous casarian with the per ting room in rea l ness f r pr mpt action in case f rupture but have had no occasi n to open the ab lomen u f r these circum stances Such a saf guard cann t be exte ded through pregnancy The danger of ruptu e d r g pregnancy has generally been regar l ed as of second ry importance These cases in icate that it de rves re al consi leration If the scar of the casa r an secti n done through the l er uterine segment pr es to be less l kely to rupture we may look in th s direction f r at least a partial solution of this pr l em

VAGINAL PLASTIC OPERATION FOR CYSTOCELE VESICOVAGINAL FISTULA AND HIGH RECTOCELE

Dr Thomas J Watkins *Cystocele* In discussing per tive repair of cystocele I wish to emphasiz the importance f th rough di secti n of the an terior vaginal w ll of the making of fascial flaps b skinni g off th mucous membrane from the f sci on either si le by m ans of a sharp scalpel and of extend g the fas ial flaps well down o er the urethral body e pecially in patients s ffering from incontinence In such cases the fascia t nds to re tract and bec me f xed t this point and should be f el n obilized so as to gi e a large amount of loosened t su f r firm repair

Thorough s paration of the bladder from th cervi is important t insu e suffi ient elevation of the bla l er wall when th herni is closed

It is also important to separate one or two inches of the broad ligaments from the cervix on either side so as to obtain a greater degree of mobilization and more firm tissue for the closure of the hernial ring This procedure al o lengthens the vaginal canal and displaces the cervix upward and backward which materially aids in the operative repair The excision of a V shaped piece of the anterior lip of the cervix is also often useful

There are two objects in the repair of cystocele one the firm closure of the hernial opening and the other the restoration of the anterior vaginal wall especially the urethra to its normal location Methods for the accomplishment of these tv o ob jectives will vary in the individual case depending upon the age of the patient the extent of the lesion and the complications present

Vesicovaginal fistula A thorough dissection such as given above v as extremely valuable in the repair of vesicovaginal fistula especially in the com plicated cases involving the cervix or the neck of the bladder This procedure eliminates the necessity for denudation and permits the conservation of all the tissues which is important especially in cases in which there has been much loss of tissue It also permits of a free mobilization even to the extent of bringing the upper part of the fistula down to the urethra It is especially advantageous to freely separate the mucous membrane from the fascia along the urethra in cases involving the sphincter In some apparently hopeless cases of sphincter de struction this will permit of the establishment at times of urinary control He believes that in most of these cases the sphincter is not entirely destroyed but is retracted and it is for this reason that he emphasizes the importance of free mobilization of the fascia lateral to the urethral body

High rectocele In high rectoceles I use thorough dissection of the posterior vaginal wall extending over the hernial opening skinning off the mu cous membrane from the fascia in much the same manner as employed for cystocele With such dis section the nature of the fascial lesion becomes easily discernible and restoration of the rectovaginal septum to about its normal condition is easily accomplished There is al ays abundant tissue for closure of the hernial opening and this can be easily obtained if dissection is sufficiently extensive Experience in the repair of these lesions induces the belief that high rectoceles are rather common often neglected and frequently disturb the rectal functions

DISCUSSION

DR W C DANFORTH Some time ago I saw Dr Watkins clamp off and dissect the broad ligaments on either side in dealing with cystocele and prolapse of moderate degree I have found this an exceed ingly useful and very simple procedure which gives us very good results and takes but little time to carry out particularly in deal ng with prolapse of moderate degree

DR ARTHUR H CURTIS As Dr Watkins has suggested I believe there is no point in the technique of repair of vesicovaginal fistula which is so im portant as that of thoroughly dissecting out the bladder in order that the walls may fall together without tension

I too am very much impressed with cutting of the broad ligaments and bringing them together in front of the cervix I would like however to ask Dr Watkins whether any of his patients on return ing to him reported discomfort at the time of inter course because of the ridge made by the folded ligaments This week I saw two patients who com plained of dyspareunia and I found there was a little sensitive ridge where the broad ligaments were folded together

DR J B DELEE I would like Dr Watkins to tell us how we can prevent these injuries

DR WATKINS (closing the di cussion) After Sims devised a non capillary suture that was the suture in use for many years and only recently have surgeons closed some of these openings with catgut I take it that the reason why Sims and his followers got such good results from what the called the non capillary suture was not because it was non capillary but because it was a suture that lasted a long time it did not absorb or cut out The way to prevent tearing a handkerchief would be to keep from pulling too much on it and I take it that the way to prevent these tears is to do away with the amount of tension put upon it I presume a deep episiotomy would be a big prophylactic in the prevention of rectocele

DR DELEE Would it be of high *rectocele*?

DR WATKINS More so of the high than the low because you get tension on the fascia from the cervix down and the upper part of the fascia is the weaker part I would just like to make this point If one makes a rectovaginal examination on a patient who has never been delivered he must be conscious of the fact that there is very *little firm tissue* in the upper part of the rectovaginal septum but if one examines the abdominal walls in a great many patients those with large tumors and thin patients in whom the backbone and skin are about in apposition one is also impressed that there is very little tissue in the abdominal wall and yet there is enough to prevent herniation *There is* enough tissue in a vesico vaginal septum to prevent hernia bearing accidents

The question of preventing cystocele I take it would be entirely the question of preventing the cervix from being pushed down in front of the child s head Just how that should be done is up to the obstetrician

As to cutting the broad ligaments I take it that in a great many of these cases the prolapse espe cially an old prolapse is very much the same as in a ventral hernia In ventral hernia the tissues re tract and become fixed and in an old cystocele the tissues retract and become fixed and that is why there is not always an abundance of loose tissue un less we do a mobilization By cutting the broad ligaments one gets mobilization By bringing the

broad ligaments in front of the cervix especially after taking a V shaped piece out of the cervix One builds up a buttress underneath the hernia and as most of these cases have some herniation the bringing together of the round ligaments must raise the uterus by tilting the cervix backwards and upwards

In operating for cystocele without opening the peritoneal cavity we have been impressed lately that by doing the repair work at the cervix first you get a very much better displacement of the cervix upward and backward than when you commence at the urethra and suture back

AIR EMBOLISM IN OBSTETRICS

DR JAMES A GOUGH contributed a paper by invitation entitled Air Embolism in Obstetrics (See p 27)

DISCUSSION

DR J B DELEE The case the Doctor mentioned occurred before a class at Northwestern University held in the clinic amphitheater of Dr Murphy The woman had placenta prævia and I had done a version followed by extraction She continued to bleed and I was packing the uterus She was in good condition and not anæmic When the packing was about three fourths finished she collapsed and turned blue and the anæsthetist said he heard a gurgling sound in the heart I finished packing very rapidly inverted the woman and practiced artificial respiration by powerful compression of the chest In twenty minutes the woman recovered We concluded it was an air embolism I was so interested that I sent a letter to several obstetricians asking if similar cases during packing had come to their notice I received one report of a patient who during the packing process had gone into collapse and died from air embolism

DR CHARLES E PADDOCK There is no death so tragic or which leaves the attending physician in such a feeling of helplessness and mental anguish as that occurring in child birth

This paper tonight shows how helpless we are when certain accidents occur in child birth When we consider the conditions present the large venous sinuses and the air compression which must of necessity result when a placenta is removed manually or the hand is inserted into the uterus for other purposes it is a wonder that more cases of air embolism and death do not occur

It seems to happen just as frequently in normal deliveries as in difficult ones

About twenty five years ago I had occasion to insert a Barnes bag into the cervical canal for the purpose of inducing labor suddenly the bag burst and in a minute the patient was dead

At that time deaths from air embolism at child birth were thought impossible Ill y fa the noted English obstetrician advised either the use of air or water when inflating the bag thus evidently refuting the possibility of a rupture of the bag and death from air embolism The sad part of the report of this case is that we will continue to see similar ones How they can be prevented I do not know

The exhaustive thorough postmortem examination done by Dr Gideon Wells and the report made a part of this paper speaks well for the scientific interest shown by Drs Gough and Hutchinson in arriving at the exact cause of death There is a tendency on the part of the physician for sentimental reasons to avoid asking for a postmortem examination a condition to be regretted

DR JOSEPH L BAER We use a routine in the maternity service at Michael Reese Hospital which I think has some bearing on this type of disaster That routine consists in the immediate approximation of the knees of the patient at the termination of the second stage and again at the termination of the third stage The direct purpose of that routine is to prevent an inrush of air into the uterine cavity The extreme rarity of the occurrence of air embolism might tend to make such routine appear burdensome but it is just as easy to tell the patient to bring her knees together or to bring them together for her as it is to leave the knees widely abducted and I believe that this routine should be emphasized as a prophylaxis against this sort of fatality

DR RUDOLPH W HOLMES Air embolism is extremely rare and comes without forewarning and I hardly see how we may do anything to prevent it The mechanics of its production are unknown though theories are rampant I have used the intra uterine tamponade on the slightest provocation even using it as a prophylactic precaution in many instances in which I feared secondary atony or hæmorrhage Repeatedly after the introduction of the gauze air will be expelled from the uterus and vagina the gurgling sounds as contraction takes place Like *some I have heard air escape from the* vagina where ergot or particularly where pituitrin had been used If air within the uterine cavity contributes to air embolism it is truly remarkable that no instance has occurred in my experience following tamponade If any prophylactic measure may be imagined I believe the routine light compression of the fundus for a period after delivery is a safe precaution

DR JAMES A GOUGH (closing the discussion) As Dr Wells described it air embolism occurs almost exclusively in operative deliveries and the reason is that when the hand or instrument is introduced into the uterus the latter is relaxed and is carried in at this time As soon as the hand draws down a limb in doing a version or when the *forceps is applied and traction is made on the head* the uterus begins to contract In cases where air embolism has occurred it is assumed that partial separation of the placenta has occurred at one edge The air that entered during the period of relaxation of the uterus gets between the uterine wall and the placenta When the uterus contracts the air is forced directly into the open vessels

ANDREAE
VESSALII BRVXELLENSIS,
PHILIPPI HISPANIARVM
REGIS MEDICI
CHIRVRGIA MAGNA
in ſeptem libros digeſta:

De qua nihil deſiderari poteſt quod ad perfectam atque integram de curandis humani corporis malis methodum pertineat

Ab Eraſtum, Philoſopho ac Medico Regio P
ſcripturi emendata
ac locupletata

Prima editio ſuperioribus quidem Chirurgi omnibus hac tempeſtate quamuis doctiſſimis

Cum ampliſſimis Indicibus tum capitum, tum rerum omnium memorabilium

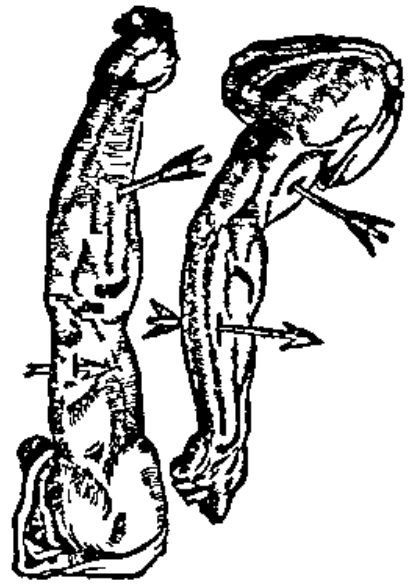
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VENETIIS Ex officina Valgriſiana
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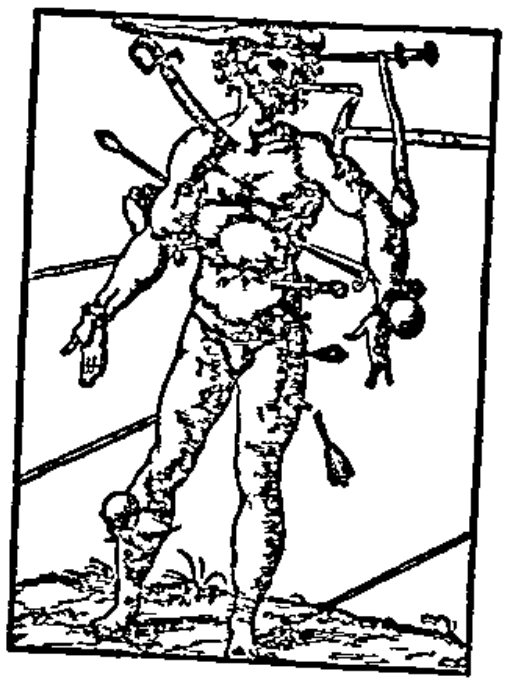
Ex Bibliotheca Wanckhegiana

Brachia malefactorum ſagittis perforata.



Andreas

Corpus malis modis vulneratum



Quomodo

Quomodo plumbeus globus immiſſus extrahatur.



Brachia

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J. BROWN, M.D., F.A.C.S., OMAHA, NEBRASKA

THE SEVEN BOOKS OF SURGERY OF VESALIUS

FROM its inception until recent years surgery has been inseparably connected with anatomy. The men that we think of as great anatomists were also great surgeons and vice versa. Anatomy was the basis of surgical knowledge. The individual man might excel in one or the other and his name thus become connected with surgery or anatomy almost to the exclusion of the other. This was particularly true of Vesalius. He was so pre-eminent in anatomy that the fact of his being also a practicing surgeon and one of the greatest of his time is almost lost sight of. His surgery however has been preserved for us by one of his students. During his residence in Madrid as physician to King Philip of Spain he was apparently active in the practice of surgery. Unlike the majority of the physicians of that time he did his surgery himself. As he had worked in anatomy, doing his dissections himself and learning from first hand information, so he did his surgery. He had raised anatomy to a high plane. In surgery during his residence in Spain he did the same thing and was quite instrumental in bringing about the fall of the barber surgeon.

The writings of Vesalius himself however are practically all in the field of anatomy. One of his students and probably an assistant, Prospero Borgarutius, feeling keenly that the surgical teachings of Vesalius should not be lost, undertook to preserve them in a book which was published in 1569 by Valgrisius. The book follows the stereotyped form of the surgeries of the time. Written in Latin, the language of medicine, it is divided into seven books as stated in the title. Book one treats of luxations and their replacement, book two of fracture and their treatment, book three of wounds, book four the treatment of ulcer, book five the subject of tumor, book six of antidotary and book seven of surgical medicaments.

It is interesting to note that anatomy is not included but Vesalius had personally written so much and had successfully contradicted the then current Galenic anatomy that it is fair to assume the author considered a chapter on anatomy unnecessary.

One of the most interesting portions of the work is the introduction part of which tells the story of the publication. Borgarutius says: Because of this factor it happened that after Hippocrates, Galen, Avicenna, Celsus and many others of the same type, Andreas Vesalius of Brussels, at one time physician to the king and a Caesarine had shown many (new?) things. Some of these are known. Others because of his untimely death would be therefore buried unless they should be published by the industry of someone, especially one of the number that had the greatest opportunity of study with him. Since I especially am of this number and since I understood that he was the personification of a kindly heart and if anyone loves such a one let him desire his immortality and as I have realized how much I have been forwarded by the great name of Vesalius whom I have always obeyed as if there were the power of a god in this human. Therefore I have always avowed this by the immortal gods that should the opportunity at any time offer itself to me by which I might show the incredible benevolence of that great man I would follow him by that opportunity most diligently. He then goes on to say that later when Valgrisius suggested the publication of a surgery of Vesalius he grasped the opportunity to pay this great debt and the work as published is the result. This book differs from the majority of those of the time in being but sparsely illustrated. The Vesalius skeletons are shown in connection with fractures and dislocations. The chapter on wounds is illustrated by a reproduction of Brunschwig's arrow extraction and a modification of Gerssdorff's adaptation of the zodiac figure to show various wounds. A few instruments are shown.

Vesalius' correlation of anatomy with clinical surgery and the fact that during his training as an army surgeon he did the work himself are his greatest contributions to surgery, excepting perhaps his description and diagnosis of abdominal aneurism (1555) even though he believed the arteries carried vital fluid and veins were the only blood circulation organs and his successful operation for empyema on Don Carlos of Aragon in 1562. In the chapter on tumors he includes abscess, carbuncle and inflammatory swellings but differentiate between hidden and surface scirrhus and in carcinoma advises excision especially in the breast.

Though *The Seven Books of Surgery* is the only written record left us of the clinical life of Vesalius it is fair to assume that he had a great influence on the surgery of the time, especially as he was able to instill such loyalty in his students and associates. His teaching was sound and his methods logical for the then knowledge.

BOOK REVIEWS

A REVIEW OF NEW BOOKS IN GYNECOLOGY AND OBSTETRICS

By HERBERT M LITTLE B A M D F A C S Montreal, Canada

IN 1921 the Appleton Publishing Company began issuing a series of gynecological and obstetrical monographs which were to cover the entire field having as their aim to satisfy the needs of the man in practice and not those of the undergraduate student of medicine Several of the first ten volumes to appear have already been reviewed in these pages and the series is now complete with the five futher volumes herewith reviewed

The publishers wish it emphasized that the fifteen monographs are obtainable only as a series and will not be sold separately

I have read the five volumes from cover to cover with no little interest and with still more mental and professional benefit Each deals with a separate problem of importance to the practitioner and it is surprising to note that although many of the questions discussed are touched upon by all these writers the reader receives the impression that from a practical standpoint there is comparatively little difference in the practice of men of broad experience

TAUSSIG who deals with *Diseases of the Vulva* has a limited field for discourse and his characteristic thoroughness from embryology through anatomy and pathology to differential diagnosis of diseases many of which border on the field of the dermatologist leaves the average reader aghast at the paucity of his own knowledge compared with that of the author Unfortunately the illustrations are not in keeping with the letter press and subject matter being for the most part reproductions of photographs which leave much to be desired

RUBIN deals with *Symptoms in Gynecology*[2] and divides his monograph into three parts (1) the etiology of symptoms (2) the analytical consideration of symptoms and (3) examination and diagnosis Stress is laid on the correlation between gynecology and internal medicine also on the importance of follow up and team work in group diagnoses

The main feature of this monograph is of course Rubin's well known work on transuterine and transperitoneal insufflation This particular portion is excellent That part of the book dealing with the ovaries and ductless glands generally will probably go over the heads of the majority of readers whether to their disadvantage or not future years may tell

The liberal references to Aschner's work do not add to the clarity and indeed wherever we are obliged to detour from the author's clear-cut personal experiences we become more or less mired in the by way Let it be understood however that the book is extremely well worth reading particularly that part referring to genital bleeding and amenorrhœa and to sterility It will surprise the average reader that in children gonorrhœal infection is in reality a rarity I hold that in the vast majority of cases vaginitis is the result of an infectious catarrh similar in nature and perhaps in pathogenesis to angina tonsillaris—manifestations of infection by the micrococcus catarrhalis—a secondary invader in the exanthemata of childhood

CULBERTSON'S *Surgery of the Female Pelvis*[3] is an encyclopædic description of operations on the genital tract from the vulva to the tube and ovary with casual excursions to the region of the gall bladder The technique is described in detail and the illustrations though not numerous are well chosen many being original The literature quoted is extensive and the references are most complete Notes on pre-operative preparation and post operative care are missing We mark sympathetically the sense of appreciation of the important contributions to American gynecology by J Clarence Webster Although dealing primarily with the surgical aspect of diseases the author is sufficiently broad minded to appreciate the value of radium and gives clearly the broad indications and limitations for both radium and surgery

THE volume by DAVIS on *Complications of Pregnancy* might well find a place in the bag of any obstetrician who anticipates the prolonged supervision of a labor It is delightfully written by a master of English full of unusual clinical observations justified by case reports from the author's wide clinical experience If a fault must be found it might be that the bibliography is imperfect in its indefinite association with references in the text

[1] Diseases of the Vulva By Frederick Joseph Taussig A B M D F A C S New York and London D Appleton and Company 1921

[2] Symptomatology in Gynecology Etiology and Interpretation With Notes on Diagnosis By Isidor Clinton Rubin M D F A C S New York and London D Appleton & Company 1921

[3] Surgery of the Female Pelvis By Charles Gray Culbertson A B M D F A C S New York and London D Appleton & Company 1921

[4] Complications of Pregnancy By Edward P Davis A M M D F A C S New York and London D Appleton and Company 1921

In the discussion of toxæmia we find the interesting circumstance recorded that patients who pass through eclampsia and recover and are subsequently thoroughly examined are found to be in better condition than those who had toxæmia to a considerable extent during pregnancy and escaped eclampsia the logical inference is that eclampsia is one of nature's methods of rescuing the woman sometimes at the expense of the child in other cases saving both mother and child The question of blood pressure in toxæmia is thoroughly discussed as is also the importance of the more delicate urinary and blood examinations Cæsarean section is not favored when it is unavoidable the anæsthetic of choice is ether and oxygen Placenta prævia is rather radically considered as an ectopic pregnancy necessitating surgery as urgently as if the ovum were lodged in the tube In the active treatment of any form of hæmorrhage the possibility of infection must never be overlooked In cardiac disease the condition of the heart muscle is the deciding factor but accurate determination often presents great difficulties In discussing the effect of intercurrent diseases on pregnancy the author contributes numerous personal observations which to my mind constitute one of the most valuable sections of the book In the chapter on abortion we read anent the campaign against abortion that a living wage decent living conditions and the ability to accumulate savings are important in encouraging marriage and the production of healthy children with the avoidance of purposeful interruption of pregnancy Vice and crime are lessened in proportion as healthy early marriage becomes possible Under our civilization in many instances economic conditions make early marriage very difficult or impossible The remedy for this state of affairs lies not in a large standing army with government control of the population but in just decent and fair economic conditions which make a decent and natural life possible for all —proper sentiments from a charming gentleman whose one clinical weakness might be expressed as a sublime though largely olfactory faith in the efficacy of iodoform gauze

The index is complete and the illustrations largely from Bumm's work are very satisfactory

GELLHORN on *Non-Operative Treatment in Gynecology*[1] furnishes a veritable mine of valuable and essentially practical information As a text book for practitioners this monograph would do much in helping to curb the activities of those who by ill timed and injudicious operating have done so much to discredit our specialty

The opening which deal with history taking and method of examination condemns the routine use of the sound and curette and relegates them to their proper place—the scrap heap A subject later considered under psychotherapy where the relation of physician to patient is more fully discussed might well have been included in this section

The main work divided into two large sections dealing first with diagnosis and treatment and secondly with technique commences with a thorough consideration of disturbances of development In this chapter we find a discourse on infantilism and asthenia and—rather a novelty in our literature—on the relations of these and other constitutional anomalies to genital function In this connection I wish to subscribe to the author's statement that the science of endocrinology is not nearly so fully developed as many enthusiasts would have us believe The chapter on disturbances of mechanics includes a discussion of the mechanical causes of displacements the rôle of displacements in coincident pathological conditions and suggestions for rational treatment including much in reference to pessaries The chapter on infections contains the results of the author's exceptionally wide experience in female gonorrhœa and is abundantly filled with definite instructions as to treatment It contains also much of value in connection with pelvic infections from other causes venereal disease in general and tuberculosis Under the heading of *new growths* the diagnosis life history and treatment of benign and malignant tumors whether by radium or operations is presented succinctly and this chapter is rounded out by valuable instructions in the symptomatic treatment of inoperable carcinoma There are further chapters on disturbances of nutrition disturbances of function symptoms of disease and the treatment of hæmorrhage amenorrhœa leucorrhœa dysmenorrhœa pruritus and a wonderful chapter on sterility *and obesity*

The section on technique deals with tampons topical applications the treatment of endocervicitis the limited indications for curettage *hydrotherapy* the effect of dry heat gymnastics the nasal treatment of dysmenorrhœa powder treatment of vaginal discharge and protein therapy the latter an innovation in American *textbooks*

Could one ask a more complete guide to treatment? We doubt it but the author conscious perhaps of a limitation unsuspected by the reader has added a chapter on radiation therapy by Henry Schmitz equally an authority of the first rank in this particular phase of the work

[1] NON-OPERATIVE TREATMENT IN GYNECOLOGY By George Gellhorn M D FACS New York and London D Appleton & Company

AMERICAN COLLEGE OF SURGEONS

PLAN FOR THE ORGANIZATION OF A JUNIOR CANDIDATE GROUP

IT has long been felt by the Board of Regents that the American College of Surgeons has failed to make provision whereby its ideals might be imparted and assistance extended to the young prospective surgeon from the time of his internesliip through the seven years of practice which he must pursue before he is eligible for Fellowship in the College These are in reality the formative years of his career when the temptation to commercialize his practice is most pronounced Accordingly at a recent meeting it was proposed to organize a Junior Candidate Group which would make it possible for the College to take these men under its wing from the very beginning of their career The following plan was adopted

THE PLAN

I In establishing a Junior Candidate Group it is proposed that the candidate be placed on a probationary list as early as two years after graduation with the understanding that they be acceptable as Fellows *not earlier than seven years after graduation and subject to the present provision of the filing of one hundred case records as evidence of their professional qualifications* that the applicants for appointment as candidates shall fill out and sign the same application blank together with the *anti fee splitting pledge* as is required of all Fellows admitted to the College

These young men during their probationary period shall file annually on carefully prepared blanks provided by the College a summary of their activities for each year of the probationary period All of these data will be placed on file and become a part of the application papers of the candidate and will have a bearing upon his acceptance at the end of probation as a Fellow of the College

II Applicants for membership in this group whose papers have been properly filed and whose applications have been approved shall be known as Junior Candidates for Fellowship in the American College of Surgeons and shall be termed members of the Junior Candidate Group of the American College of Surgeons They shall be eligible for associate affiliation with their respective state or provincial sections or chapters of the College

III Any legalized practitioner of medicine who has been graduated from an approved medical school for a minimum period of two years and who expects to specialize in surgery or some branch of surgery may apply for membership in the Junior Candidate Group A prospective candidate may personally ask to have his name filed in the central office of the College or such request may be made in his behalf by a member of the medical profession who is in good standing

IV If an applicant for enrollment is vouched for by a Fellow of the College an application blank and declaration of principles shall be forwarded to him with the request that they be filled out signed and returned to the office of the College His application will then be submitted for consideration at the *first succeeding meeting of his respective state or provincial credentials committee* If applicant for enrollment is not vouched for by a Fellow of the College either at the time the request is filed or subsequently by correspondence with the central office the communication shall be acknowledged and his name submitted for consideration at the first succeeding meeting of his respective *state or provincial credentials committee* If his name is then approved the applicant shall be notified that he has been recorded as a member of the Junior Candidate Group for Fellowship in the American College of Surgeons and will be forwarded the regular application blanks

V A junior candidate list will be published each year in which shall be included the names of all those who have qualified for this group These names shall be classified by years of eligibility for Fellowship under their respective states provinces and countries

VI Candidates shall be exempt from all fees or dues until admitted to full Fellowship in the American College of Surgeons when the regulation Fellowship fee of $100 and annual dues of $25 will become due

VII Each candidate shall be known as a member of the Junior Candidate Group of the American College of Surgeons

VIII A candidate shall remain a member of the Junior Candidate Group while he continues to develop a specialty of surgery and until he is eligible for Fellowship in the College and has filed acceptable case records as evidence of his surgical qualification If for any reason a candidate finally fails to qualify as a Fellow he shall be notified and dropped from the list of candidates

IX The candidate shall be eligible to attend the annual and sectional meetings of the Clinical Congress of the American College of Surgeons In his private and professional life he shall be required to carry out all of the requirements of the American College of Surgeons with the same degree of fidelity as is expected of the Fellows of the College

THE ORGANIZATION OF JUDICIARY OR ADVISORY COMMITTEES IN THE STATES AND PROVINCES

THE selection in each State and Province of an Advisory or Judiciary Committee on Local Affairs of from three to five members has been authorized such committees to be elected by the Fellows of the College at the time of the State or Provincial sectional meeting each committee to elect its own chairman

When complaints of unethical or other unfavorable conduct on the part of any of the Fellows are filed in the Central Office the local committee will be notified and asked to make an informal investigation of the rumor and report findings to the Central Office The report will be submitted to a Central Judicial Committee The local Advisory Committee also will be in a position to take initiative where information derogatory to a member is brought before it The local Advisory Committee should submit all its recommendations to the Central Judicial Committee

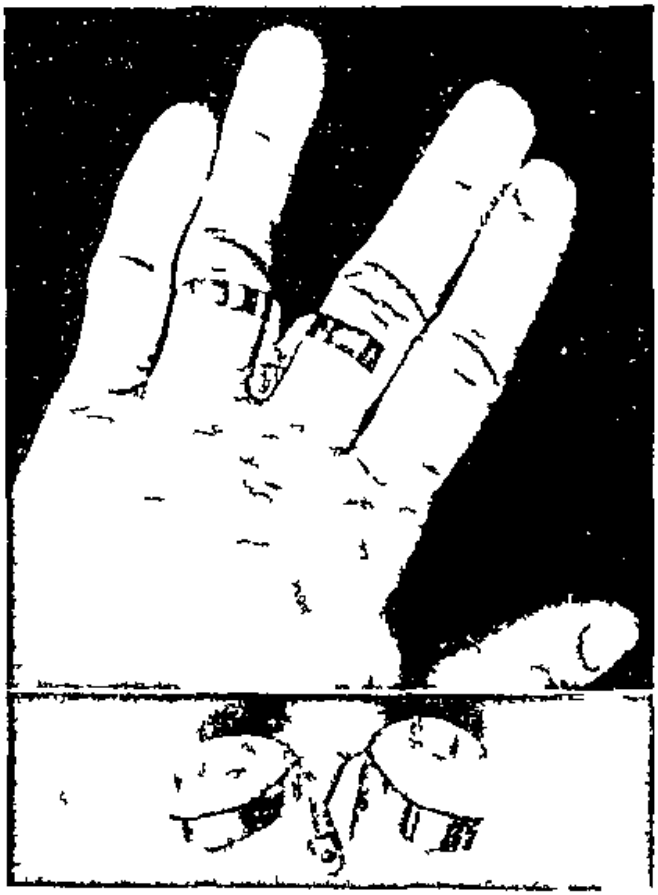
The Central Judicial Committee will be appointed by the Board of Regents from among the Fellows of the College and will be headed by the Attorney of the College The Central Committee will meet at least once a year immediately preceding the annual meeting of the Clinical Congress to consider carefully all problems that are properly prescribed to it and make its recommendation to the Board of Regents

A NEW INSTRUMENT TO BE CALLED THE REGISTRY OF BONE SARCOMA SCISSORS

By E A CODMAN MD FACS Boston

THIS instrument is fully shown in the figure It consists of the blades of a small pair of scissors with two metal rings welded to the backs of the blades The metal rings are slipped over the two middle fingers just behind the proximal *joints The surgeon can wear it without* hindrance while operating and can cut his ligature and sutures very readily and so rapidly that the act appears sleight of hand Any surgeon can have one made for him by cutting off the end of a small pair of scissors back of the screw and having rings of brass or German silver welded on the back of the point I believe this instrument will be widely used and although slight detail may be changed the principle of using minute scissors in the clefts between the fingers is likely to survive It is intended to have a number of these instruments made up and stamped with the words Registry of Bone Sarcoma If any surgeon wishes to try one I will gladly order one for him at cost

We all want to contribute our bits to surgical technique and to surgical science This is my bit for I believe this principle is not in use So far as I know it is the first cutting instrument to utilize the power of the interossei and lumbricales It leaves all the ordinary mechanisms of the hand free for other use The idea occurred to me from seeing Lower's ingenious thimble device for the same purpose If this bit survives I hope the idea of the Registry of Bone Sarcoma will survive with it I would like to see the instrument become a little mechanical conscience at least as far as registering cases of bone sarcoma is concerned It will tell its owner that he should do something for medical science in return for the multitude of



facts and appliances which medical science daily permits him to use

It is my hope in presenting this instrument to the profession that it will become the fashion to make it socially uncomfortable for any surgeon who is found using this appliance if he has not recorded his cases of bone sarcoma to the best of his ability He must be jollied into registering or jollied out of using the scissors

Partly to control the name of the instrument and partly to make a fortune out of it should its use extend to industry and to the household sewing basket a patent has been applied for I am much more likely to make a fortune from the patent than I am from my knowledge of bone sarcoma for I have repeatedly stated that I shall never make any charges for seeing in consultation patients with this condition When my ship comes in and all the surgeons in the United States are reporting their cases I shall be able to write a beautifully illustrated book on The Registered Cases of Bone Sarcoma

A description of the object of the Registry of Bone Sarcoma may be found in SURGERY GYNECOLOGY AND OBSTETRICS March 1922 pages 335 343 and another paper describing its method of procedure is now in press and will soon appear in the same journal

STATE MEETINGS OF THE CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

VIRGINIA AND WEST VIRGINIA PENNSYLVANIA NEW JERSEY AND DELAWARE MASSACHUSETTS RHODE ISLAND NEW HAMPSHIRE CONNECTICUT MAINE AND VERMONT AND NEW YORK

THE State Sectional meetings of the Clinical Congress of American College of Surgeons scheduled to meet in the Spring have just recently been completed The Fellows of the College the hospital people and the public were keenly interested in the subjects discussed and enthusiastic in the carrying out of the program The following is a brief report of these meetings

VIRGINIA AND WEST VIRGINIA

1 The Sectional Meeting for Virginia and West Virginia was held in Richmond Virginia on May 2 and 3 Headquarters and meetings were at the Jefferson Hotel Clinics were conducted in the local hospital The visiting speakers were Douglas Freeman Ph D Richmond Dr John O Polak Brooklyn Dr Malcolm T MacEachern Chicago Rev C B Moulinier S J Milwaukee and Dr Allan Craig Chicago Chairman Dr J Shelton Horsley Chairman of Committee on Arrangement Dr Robert C Bryan

The State Executive Committees elected for the coming year for Virginia and West Virginia were as follows

VIRGINIA

Chairman—C P Jones Newport News
Secretary—J E Rawls Suffolk
Counselor—H H Trout Roanoke

WEST VIRGINIA

Chairman—G C Schoolfield Charleston
Secretary—John E Caldwell Charleston
Counsel—Hugh G Nelson Charleston

It was decided to hold next year's meeting in Charleston West Virginia

PENNSYLVANIA NEW JERSEY AND DELAWARE

2 The Sectional Meeting for Pennsylvania New Jersey and Delaware was held in Trenton New Jersey on May 5 and 6 Headquarters and registration were at the Stacy Trent Hotel Clinics were conducted in local hospitals The visiting speakers were Hon F W Donnelly Trenton Dr William Francis Campbell Brooklyn Dr Halton C Cassidy Montreal Rev C B Moulinier S J Milwaukee Dr Malcolm T MacEachern Chicago and Dr Allan Craig Chicago Chairman Dr B Van D Hedges Plainfield Chairman of Local Committee on Arrangement Dr G N J Sommer Trenton

The following State Executive Committees were elected for the coming year

NEW JERSEY

Chairman—C N J Sommer Trenton
Secretary—W W Brooke Bayonne
Counselor—James Green Elizabeth

PENNSYLVANIA

Chairman—W L Fetes Bethlehem
Secretary—S P Meixell Wilkes Barre
Counselor—J J Buchanan Pittsburgh

DELAWARE

Chairman—J A Fillgood Wilmington
Secretary—W O Lafferty Wilmington
Counselor—H I Springer Wilmington

It was decided to hold next year's meeting in Scranton Pennsylvania

MASSACHUSETTS RHODE ISLAND NEW HAMPSHIRE CONNECTICUT MAINE AND VERMONT

3 The Sectional Meeting for the New England States was held in Providence Rhode Island on May 8 and 9 Headquarters registration and meetings were at the Providence Biltmore Hotel Clinics were conducted at the local hospitals The visiting speakers were Governor W S Flynn Providence Dr W H P Faunce Providence Dr Harry Mock Chicago Dr Henry S Plummer Rochester Minnesota Dr Malcolm T MacEachern Chicago Rev C B Moulinier S J Milwaukee and Dr Allan Craig Chicago Chairman Dr John W Keefe Providence Chairman of Local Committee on Arrangements Dr Frederic V Huntley Providence

The following committees were elected for the coming year

MASSACHUSETTS

Chairman—H G Stetson Greenfield
Secretary—E L Hunt Worcester
Counselor—P E Truesdale Fall River

RHODE ISLAND

Chairman—J h W Keefe Pro id e
Secretary—I e lene V H ssey Pro idence
Counselor—Georg A Matteson Pro iden e

NEW HAMPSHIRE

Chai man—Ir J P o ty Kee
Secretary—J mes W Jam so C conrd
C l r—J hn H C so Man h t

CONNECTICUT

Ch irman—F N Spe y New H r
Sec etary—Fntz C Hyde C wich
Co nsel r—Sel lom B O l ck Pomfret

MAINE

Chai m —Will m Br ff rd Portl d
Se t ry—Ca l R b so P rtl d
C n elo—F B S g B ng r

VERMONT

Chai a —I T Brow B rlingt n
Secretary—W W Town nd B rl gt
Counsel —William Stickn R tla d

It was decided that next year s Sectional Meeting for the New England States will be held in the state of Connecticut

NEW YORK

4 The Sectional Meeting for the State of New York was held in Albany on May 12 and 13 Meetings headquarters and registration were at the Ten Eyck Hotel The Public Meeting was held in the Chancellor s Hall of the Education Building in conjunction with the Community Chorus The visiting speakers were Dr Harry Mock Chicago Dr Philip D McMasters New York City Rev J A Dieckmann Cincinnati Dr Henry S Plummer Rochester Minnesota Dr Malcolm T MacLachern Chicago Rev C B Moulinier S J Milwaukee and Dr Allan Craig Chicago Chairman Dr I M Stanton Schenectady Chairman of Local Committee on Arrangements Dr Arthur J Bedell Albany

The following State Executive Committee was elected for the ensuing year

Chairman—Arth r J B dell Albany
Secret ry—Cha les W Henni gt n Rochester
Co sel r—Ge rge F Chandl r Kingst

It was decided that the next meeting should be held in either Rochester or Binghamton

CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

ALBERT J OCHSNER Chicago *President* CHARLES H MAYO Rochester *President Elect*
FRANKLIN H MARTIN Chicago *Director General*

FOURTEENTH ANNUAL SESSION NEW YORK–BROOKLYN OCTOBER 20–24 1924
HEADQUARTERS—THE WALDORF-ASTORIA

NEW YORK COMMITTEE ON ARRANGEMENTS

EUGENE H POOL *Chairman*
JOHN A VIETOR *Secretary*

Executive Committee

CORNELIUS G COAKLEY
WILLIAM A DOWNES
ARTHUR B DUEL
BENJAMIN P FARRELL
ALFRED T O GOOD
CHARLES H PECK
ROBERT G REESE
J BENTLEY SQUIER
WILLIAM E STUDDIFORD
GEORGE GRAY WARD JR

J W BABCOCK
F W BANCROFT
J A BLAIR
R W BOLLING
E C BRENNER
W M BRICKNER
W E CALDWELL
ALEXIS CARREL
M L CHARD
J F CONNORS
W C CRUMP
A B DAVIS
E B DENCH
JOHN DOUGLAS
J C EDGAR
F C EDGERTON
C A ELSBERG
J F ERDMANN
ERNEST FAHNSTOCK
L K P FARRAR
J H FOBES
H W FRAUENTHAL
N W GREEN
J A HARTWELL
R A HIBBS
W F HONAN
L M KAHN
E L KELLOGG
ARNOLD KNAPP
B J LEE
R LEWISOHN
H H M LYLE
J M LYNCH
J E MACKENTY
FRANK MATHEWS
C E MCDANNALD
C A MCWILLIAMS
A V MOSCHCOWITZ
ALEXANDER NICOLL
J R PAGE
MARTIN REHLING
HENRY ROTH
CARLOS SAVINI
A E SELLENINGS
DEWITT STETTEN
G D STEWART
ALFRED STILLMAN
B T TILTON
P R TURNURE
J B WALKER
A O WHIPPLE
L R WILLIAMS

BROOKLYN COMMITTEE ON ARRANGEMENTS

JOHN E JENNINGS *Chairman*
THOMAS M BRENNAN *Secretary*

Executive Committee

WARREN L DUFFIELD
EDWIN H FISKE
RUSSELL S FOWLER
EMIL GOETSCH
CHARLES A GORDON
O PAUL HUMPSTONE
FRANK D JENNINGS
WILLIAM LINDER
RALPH I LLOYD
JOHN O POLAK
NATHANIEL I RATHBUN
JAQUES C RUSHMORE
CHARLES E SCOFIELD

N J BLACKWOOD
W I CAMPBELL
J M DOWNEY
ROGER DURHAM
H C FETT
ALEXANDER GILLIGAN
J GOLUB
J HAAR
B D HARRINGTON
H H HECK
A C HOLZMAN
H T LANGWORTHY
G I MILLER
C D NAPIER
W A PASCAL
JOHN RANKEN
G H REICHERS
A A ROBERTSON
E W SKELTON
JOSEPH TENOPYR

PRELIMINARY PROGRAM FOR NEW YORK-BROOKLYN MEETING

IN the following pages is presented a preliminary program of the clinics and demonstrations to be given in the hospitals of New York City and Brooklyn during the fourteenth annual session of the Clinical Congress of the American College of Surgeons The program as published is a tentative one and is to be revised and greatly amplified previous to the meeting so that the final program will completely represent the clinical activities in all departments of surgery of Greater New York

Clinical demonstrations or dry clinics in which the surgeons internists pathologists roentgenologists and other specialists will participate are to form an important feature of the program Important surgical subjects are to be discussed from all angles bringing to bear the best thought on these subjects as developed in the several departments of medicine The real program of the Congress will be issued daily during the session giving in complete detail a description of the clinics and demonstrations for the following day

Of great interest to the specialists in ophthalmology otology rhinology and laryngology is a series of clinical demonstrations being developed by the Committee to be given each morning in the Manhattan Eye Ear and Throat Hospital New York Eye and Ear Infirmary Bellevue Hospital and other institutions so that visiting surgeons who are particularly interested in those departments of surgery may find a full program for each of the four days of the session

The morning and afternoon hours of Monday and Tuesday are set apart for the annual conference on the hospital standardization program of the College and the problems related thereto These sessions will be held in the ballroom of the Waldorf Astoria The program for the conference will consist of papers and discussions by surgeons hospital superintendents nurses trustees and others interested in the conduct of hospitals

The presidential meeting the first formal session of the Congress will be held in the ballroom of the Waldorf Astoria on Monday evening on which occasion Dr Charles H Mayo the president-elect will be inaugurated and will deliver the annual address A feature of that evening's program will be the John B Murphy oration in surgery to be delivered by Drs John Hunter and N D Royle of Sydney Australia the subject being A New Operative Procedure in the Treatment of Spastic Paralysis

The Executive Committee of the Congress has in preparation the programs for scientific meetings on Tuesday and Thursday evenings to be held in the ballroom of the Waldorf Astoria and on Wednesday evening in the Academy of Music in Brooklyn Papers dealing with subjects of interest to the surgeon will be presented by eminent surgeons of the United States and Canada and distinguished visitors from abroad Also the Committee has in preparation a program for two special meetings to be held in the Empire Room at the Waldorf Astoria on Tuesday and Thursday evening when the papers and discussions will deal with subjects of special importance to those interested in the surgical aspects of ophthalmology otology rhinology and laryngology A complete program for the evening meetings will be published in a later issue of this journal

The twelfth convocation of the American College of Surgeons will be held on Friday evening in the ballroom of the Waldorf Astoria when fellowship in the College will be conferred upon a group of American and Canadian surgeons and honorary fellowships upon foreign guests

The rule limiting attendance to a number that can be comfortably accommodated at the clinics must necessarily be strictly enforced at this year's meeting The limit of attendance is based upon the result of a survey of the amphitheatres lecture rooms and laboratories in the hospitals and medical schools as to their capacity for accommodating visitors This plan necessitates registration in advance on the part of all who wish to attend When the limit of attendance has been reached through advance registration no further applications will be accepted Attendance at clinics and demonstrations is controlled by means of special tickets which plan has proved an efficient means of providing for the distribution of the visiting surgeons among the several clinics and insures against overcrowding as the number of tickets issued for any clinic is limited to the capacity of the room in which that clinic is given

General headquarters for the Congress will be established at the Waldorf Astoria at Thirty fourth Street and Fifth Avenue where practically the entire first floor of the Hotel has been reserved for the exclusive use of the Clinical Congress—the Ballroom Astor Gallery Myrtle and East Rooms and other large rooms and foyers adjacent thereto These rooms provide ample space for the evening meetings business sessions registration and ticket bureaus bulletin rooms etc

GENERAL SURGERY, GYNECOLOGY OBSTETRICS ORTHOPEDIC UROLOGY

CLINICS IN NEW YORK HOSPITALS

BELLEVUE HOSPITAL

Tuesday

P S Hooker A V S Lambert J A McCreery and C J McGuire Jr—9 Operations and demonstration of cases of fractures thoracic surgery gastric ulcer and sarcoma of bone

Frederick W Rice and Harold B Ely—9 Demonstration of obstetrical cases

Frederick C Holden Onslow Cordon Jr and Edwin Holladay—9 Illustrative gynecological operations with discussion on the method of post operative care of the patient Method of undergraduate and postgraduate teaching

Douglas Symmers—2 Apexes of anthracosis

J Breckstein—2 Study of duodenal morphology

W J Rensch—2 Study of gastric mucosa

I Seth Hirsch—2 Caecum-colic sphincteric tract

Wednesday

John A Hartwell—9 Operation on upper bile duct with demonstration of incision and method of drainage

Frederick W Rice and Harold Bailey—9 Demonstration of obstetrical cases

Harold Santee—Demonstration of pneumatosis and treatment of fracture

Joseph F King—Exhibition of cases of brain abscess and thoracic surgical cases

Thursday

T A Smith Edwin Beach and staff—9 Late results of fractures of neck of femur Late results of perforated gastric and duodenal ulcers

Frederick C Holden Onslow Cordon Jr and Edwin Holladay—9 Illustrative gynecological operations with discussions on the method of pre and post operative care of the patient Method of undergraduate and postgraduate teaching

Carl G Burdick and staff—2 Deformities in fracture in children the poor anatomical education Empyema method of treatment and results Plastic surgery method and results Purpura hæmorrhagica thrombocytopenia type Results of splenectomy

Friday

George D Stewart John Douglas A M Wintter R F Wilhelm W H Barber and George V Koelsch—9 Surgical teaching

Edward Keyes—9 Demonstration of urological cases

Frederick C Holden Onslow Cordon Jr and Edwin Holladay—9 Illustrative gynecological operation with discussion on the method of pre and post operative care of the patient Method of undergraduate and postgraduate teaching

RECONSTRUCTION HOSPITAL

Joseph V Blake and Associates—9 and 11 Demonstration of the operative treatment of the deformities resulting from infantile paralysis and other methods of treating fractures

NEW YORK HOSPITAL

Tuesday

Charles L Gibson—9 Operative clinic gastroduodenal perforation duodenal resection chronic appendicitis

Seward Erdman—Operative clinic tumors of the colon high enterostomy for ileus

O S Lowsley and staff—2 30 Kidney operations under paravertebral anæsthesia Demonstration of interesting postoperative cases Perineal prostatectomy under sacral and paravertebral anæsthesia

Wednesday

F H Pool—9 Thyroid operation Cases illustrating diagnosis follow up and late-operative therapy

James M Hitzrot and Clay Ray Murray—Fracture clinic operative and demonstration of cases

W M Weeden—Empyema clinic

O S Lowsley and staff—2 30 Cystoscopy pyelography Demonstration of results of operation under regional anæsthesia

Thursday

Charles L Gibson—9 Operative clinic Harris bandler micrococcus peritonitis

Frederick W Bancroft—Osteomyelitis operative treatment theoretic considerations Follow up

John A Vieto—Phlebitis

O S Lowsley and staff—2 3 Sphincterotomy under paravertebral anæsthesia Demonstration of interesting pelvic gram Scrapbook prostatectomy under sacral and paravertebral anæsthesia

Friday

F H Pool—9 Gastric cases operative

Paul Dineen—9 Discussion of follow

B J Lee—2 Bariatric operations Cases illustrating good results of breast lesions Follow up cases Congenital defects of bowel

O S Lowsley and staff—2 30 Clinic on cancer of the urinary tract treated by operation and radium and X ray

HOSPITAL FOR RUPTURED AND CRIPPLED

Tuesday

Royal Whitman and staff—8 3 Hospital rounds

W B Coley C J Burdick and staff—8 30 Operative hernia clinic

Royal Whitman and staff—Demonstration of the reduction of the structure of the neck of the femur also the reconstruction operation for ununited fracture and faulty arthritis deformation at the hip

F E Adair—2 Demonstration of types of umbilical from and inguinal hernia

Wednesday

J P Hogguet and F E Adair—9 Operative hernia clinic Demonstration of postoperative cases

Thursday

Percy Roberts and staff—8 3 Joint operations

Royal Whitman and staff—Demonstration of the operative treatment of structural scoliosis

PRESBYTERIAN HOSPITAL

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l d c t f r d al m ll m lg tricre ct n
—*Bill th H Pdly* f th Moyn ha pe ti
P B St John a d A O Whipple—Res lt in r l c l
u g ry f tle t m h llu tr t l by f ll up case
R s G LD N—D agn t p t t in r ventge l g f th
t m ha l d od m
C EO E DR ER—St les tle c t tut al ak p
f pat t th ul f the t ma h ld od m
N O Whipple a l J B St J —Ope t e cl
c s s f g tri gery
Ht Mc H CL s a l A O W ipple —P ll w p case
ill t t g bd min pe n l sc t f c r m
f th t m

Symp m—P l T t D

K s Gold N—N t d d se se f th l l ry
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R lt w th t m t t brom j hth l N a
t d
A O W IPPLE—I j tu f mm n j ct l t ng
Foll w p e lt
Lou B MA d D C B L—I r fu ct t t
A O Whip LE—I t l w n g m t lt l l
tr t urg ry
C OR Drap —Co t tut n l t l t the l e es
f the l l ry t t
A O W IPP —I oll p ase ll t t g r t
les n

D l l

Ht H Mc HINCLI s d R ss C LD N—S g f tl
b t d best l oll w up lt l d u f
N y f t
Hugh A CI N LO —Pl t u g ry l g y f l l
f ct F ll w pr lt
Louis B UM N—I l th py a ppl l t g l
D c s f res lt th l m t t l m
phthal a l ith l fun t t t
J Be TLEY Sq IER—U l g cal g y I ll w p n l
perat l
W B I RS N JR—I s f th th d
J M H FORD—Tub cul of lymph gl l l n k
Cases ill t ti g f ll p r lt
I T N B EN J —A ut t t l bstru t
D u of t tm t tog th th J f
j j o t my l t t l
William D RR c —I ra t l c
C A Fl SB G l D Le LD—D u f o-
g l s f m th t lp t f l g s p
m tal l d t tm t

MT SINAI HOSPITAL

A A B d t ff—G l g l l
Edwin B R d taff—G al g l h
C A Fl SB G d t ff—G l g l l
A V M cow z a d taff—Ce l g l l
I W N TH —Orth ped l
Ir LD J CH —N l m trau

ROOSEVELT HOSPITAL

T d y

C ARLES H P K l t ff—9 S g l cl c
H w C Tayl R an l taff—9 Cy col l cl
C I Le YER a d C W Le STER—12 S rg cal l b r
t ry l m tr t n
J M Steiner— N y l m tr t

Wed d y

James J Rus ell l t ff—9 S g l cl n
James W Wh ITE—12 S g l labo rat ry d m t at
J M St INER—1 N y l m tr t

Th d y

C ARLE H Peck l t ff—9 S g cal cl n
Hov A C Taylor d taff—9 G n c l al cl c
F I Kilhan —1 D m t t u lg l l c

Fr d y

James J Ku ll a d taff—9 S rg al l n
I F Kelb — D m t t n lg cal l

NEW YORK POST GRADUATE HOSPITAL

Tu d y

Joh T Irom —8 3 C al su g l l l
Edw D W Le R —2 C ral u g cal l
W Da UTHER— C y c l g l l
Charles O ilvy—4 o O th pe l l
F C T —4 3 D m t t f l c l a esthes

Wed d y

H D I URNI —9 C y l g l l c
L J U ce — D m tr t f blood tr n l
Charles Cori N H yb— C l u s cal l
James N Wi t— C y col gical l n
Ch L S A Ils c— 3 N u rg l cl n
B W Moffat—4 3 O th pe l l

Th rd y

T D H AL F—9 O th ped l
J Bentley Squier—9 Ur l gical cl
J J M IOR E D— T um t urg y
I I W IG I—4 3 O th pe l l c

Fr d y

Edgar W Pet sc —9 C l rg cal cli
S W Ba DLE R—9 Cyn l g l cli c
John I Erdmann— C al s gic l cl c
Ch R s Ogilvy—4 3 Orth ped cl c
F C T —4 3 De t t f local an th sa

NEW YORK NEUROLOGICAL INSTITUTE

T d y

C A Fl SB R A S Tayl R J H K N l B o
Stoo N—9 Oper t th tral n
st m

Wed d y

C A Fl SB A S T VL J H KE N a d Byro
S ORE —9 Operat th t l ners
y t m

Th d y

C A Fl S ER A S T LOR J H K N N a d Py
S ON —9 Ope t th t al n u
t

ST LUKE'S HOSPITAL

Tuesday

WALTON MARTIN WILLIAM A DOWNES W S SCHLEY N W GREEN R W BOLLING H H M LYLE F S MATHEWS JOHN DOUGLAS M K SMITH and E D TRUESDELL—8 30 General surg cal cl nic

F S MATHEWS and G M COODWIN—10 G ite ses

JOHN DOUGLAS—11 Lantern slides demonstr ting the diagnos s f s bph ic bscess and collection f fluid below th d aphragm

Wed day

WALTON MARTIN WILLIAM A DOWNES W S SCHLEY N W GREEN R W BOLLING H H M LYLE F S MATHEWS JOHN DOUGLAS M K SMITH d E D TRUESDELL—8 30 General surgical l nic

M K SMITH—10 Fracture cl nic

H H M LYLE— 3 D b l ties of the hand

H G BUGBEE F E DuBOIS and C F HOCH— 5 Exh bition of po t pe t urolog cal cases L nt rn slide talk on ur log c l bjects

Thursday

WALTON MARTIN WILLIAM A D wnes W S SCHLEY N W GREEN R W BOLLING H H M LYLE F S MATHEW s JOHN DOUGLAS M K SMITH d E D TRUESDELL—8 30 C e l su gical linic

F C WOOD—10 30 Cl nical es lt of radiotherapy

F C WOOD—2 30 Lectu e a d demonst t on the X ay pl t a d methods f me sureme t of X r ys in the adioth ape t c d p rtment

Friday

WALTON MARTIN WILLIAM A DOWNES W S SCHLEY N W GREEN R W BOLLING H H M LYLE F S MATHEWS JOHN DOUGLAS M K SMITH d F D TRUESDELL—8 30 G n l gic l l n c

T H MYERS a d associates— O thoped l c

Daily

DR BROWN R di logic l d m nst at

NEW YORK ORTHOPÆDIC HOSPITAL

Tuesday

STAFF—8 Orthoped c pe t ns

STAFF—1 3 O t pat ent linic

Wednesday

STAFF—8 Orthoped per t ns

STAF — 3 Out pat t clin

Thursday

STAFF—9 Ge e l ho p tal d

STAFF— 3 O t pati nt l c

Friday

STAFF—8 O th ped c pe t s

STAF — 30 O t p t t l

LINCOLN HOSPITAL

Tuesday

WILLIAM C WHITE—3 S rgi al cli ic

Wednesday

SETH M MILLIKEN—3 S g cal cl

Thursday

PERCY H WILLI MS—3 Gyne l g c l cl

ST VINCENT'S HOSPITAL

Tuesday

SIMON J WALSH WILLIAM FORD JOSEPH BRADY GEORGE R STUART a d C J MacGUIRE JR —9 General surg cal cl nic

GEORGE DAVID STEWART ARTHUR M WRIGHT ERNEST FAIRNESTOCK RAYMOND P SULLIVAN and EDWARD A KING—2 Su g ry of the ch st

Wednesday

RAYMOND P SULLIVAN—9 Management of cases of hyperthyroid m

JOHN ASPELL WALLACE KRUGER JOHN McGRATH JAMF P HENNESSEY AUGUST JAMES RAGGI— Ute i e d pl cements

Friday

GEORGE DAVID STEWART ARTHUR M WRIGHT ERNEST FAIRESTOCK RAYMOND P SULLIVAN and EDWARD A KING—9 Abd mi al rg ry Cast ic ca s

EDWARD L KEYES— U ol g cal u gery

REGINALD H SAYRE a d WILLIAM DORAN—2 Orthopedic cl nic

LENOX HILL HOSPITAL

FRANZ TOREK a d st ff Ca cinom of the mouth

HERMANN FISCHER l staff Local sthest in per t ns n the upp r abdomen Hæmost in p ost te tomy Pl t c f r a t ficial an s

DeWITT STETTEN nd staff Ch lecystectomy with t d ain ge Ingu l h a te hnique

CARL EGGERS and staff Ch st s pp ation

GUSTAV SEELIGMANN nd taff C mbin t n of s gery l adium in the t atment of carcinoma f the teru

FRANK R OASTLER a d staff The u e of radium at the menopause Th u e of X y in the treatment f fib o d t mors of th uteru The ad tage of p ope bl d ch mistry n the t eatment of hyperem sis gr id rum The d is b l ty of extr me d ssect ons n th tre tm nt of cystocele and rectocele

WILLIAM H STEWART and staff L t st devel pments in the oe tgen g aphic am at of the g ll bl dder a l k d y S me r fin ments in the roentg no g aph c d g os f fr ctur of th skull

GEO E L ROHDENBURG and st ff D mo st at on of the Kahn test S lt metab l m n neoplas a De elop me t of th muc ocystic ovary

SKIN AND CANCER HOSPITAL

Tuesday

C A McWILLIAMS Demon tr t on of plast c surgery and ope t ons for c cer

Wednesday

FRANZ TOREK Demon t at on of pl tic surg ry and ope t n f ca c

Thursday

GEORGE S MKEN D mo st at on of plastic surgery and ope at on f er

Friday

H H M LYLE D mo st at on of pl t c s g ry and per ti f r c c r

WOMAN'S HOSPITAL

T d y

HERMA N C AD a d E A BULLARD—9 Cynecolog cal oper t o
H G BLG EI a l st ff—9 U logic l clin
GEORGE GRAY WARD JR d I K IARRAR—2 Gyn l g c l p t
DR I LAUT— I th log al l r t y d mo tr to s
W H GLAFKE—2 30 C astr nt rol gical l c

W d d y

H E B PARDEE—9 C es fp emnan y compli at d witl he t d e
F A D MAN d L A LYO —o Dem n t ti f b t t al w l l l e y room techn q e
CEO E T WWARD JR nd L K FARRAR—10 I xh b t f d m c
W T KE N DY—10 Rad gr phy f pel c t t (D P terso t ch iq e)
B H COF — H t y yst m f tl W m n Hosp t l
DR AL IDGE— I fil t l c
D I L UT—2 I th l g c l l t r y lem t t n
F A DORYAN J I A LYON —3 D m n t ati n f ew f ll p yste n b tetn

Th d y

R M R A LS d W T KE N DY—9 Gynecol g al ope t
H C BUGBEE d t ff—9 Ur l g c l l n
D BI ELL and J H H GOFF—2 C v c l mc l pe t s
DR I LAUT— I thol g l l b t d m trat n
R F HER DEE — 30 A y d ag n d th py

F id y

HERMANN CR D a d E A BCLL RD—9 Gynec l gi al perat n
CEO GE GRAY WA D J and I K I RAR—2 Gy l gi l y t
D PL UT— P th l gic l l b t s l m n t at
W H GLAFKE—3 3 C t o nt lom l cl

NEW YORK INFIRMARY FOR WOMEN AND CHILDREN

T d y

MARIE CH D—9 Gyn l g l l
HELEN BALDWI —9 M l l pect f u g al s
C ROLIN L L —9 Use f docrin bst t

W d d y

MARIE C AR a d LMMA BE I AR N N—9 Gen r l surg ry
FLISE L E PER CE—9 G d mi os p p th l gy
NANCY JEN SO —9 Fl oscopy f hest d fter b m th m l
LEE EDWARD—9 D m nst t n f b tetr l ses

Tl d y

ELIS L ES ERA CE—9 X r y d p tm t dem nst t n
MARY PUTN M—9 S g ry ped tri
WILHE MI RA LAND—9 T tm nt of t æm s of pregna y

F d y

ANNA HUB RT— Su gi l lin c
GEO GIA R ID— Use f G thm y m thod f anæ the s d n l b

GENERAL MEMORIAL HOSPITAL

T sd y

W S STONE I LLOYD CRAVER—9 Cases of lympho-sarcom Hodgki l sease leukæmia
W B COLEY—9 Ca es f l g bo sarc ma

W d d iy

B J LEE d FRANK F A D IR—9 Cases f v us types f m mm. ry c rci ma
WILLIAM P HEALY a d DR PULLEN—9 Cases f car c ma f th ut ru a d gi a

Th sd y

JAMES F VING—1 P th l g al c f e ce e hib t n of t t st g pecim s f bo e t m rs
W S STONE n I LLOYD CRAVER— D scus. of t t g ases f l agn an l t atm t

F d y

DOUGLAS O ICK I F JOHN ON—9 Ca s of ca ce of m uth l p l t gu
WILLI M P HE LY n I D PULLE —9 Cases f car ci ma l t rus a l ngi

FIFTH AVENUE HOSPITAL

T d y

CEO G W ROBERTS—9 Gen ral surg ry
L R KAUFM N—9 U logy
WILLIAM I H N—2 G er l rgery
V SO H BING AM—2 O th ped rg ry

W ed diy

W LTE GR Y CRUMP—9 G l rgery
I S LOIZEAUX—9 Ob t trical l c
W LLI M F HOVA — Ge e l rgery

Thi d y

WIL IA L SNEED—9 Orth ped c surgery
SPR UE C RLETON—9 Ur l gy
WIL IAM H BIS OP—9 C l rgery
BIS LL P LMER— Oral rgery

F d y

L R KA FMAN—9 Ur l gy

D ly

T D ASDA BUCH N d t ff Demonstrati n æ th
D S D JES UP d taff C f en in s rgical p thol gy
LEW GREGORY CO d st ff A y d m tr t ns

SLOANE HOSPITAL

Gynec l gic l nd b tetn l l es Dem strat s Ob t tn l d gyn c l g cal p thol gy P th log al find gs t a t p th st llb rth d neo a t l d ths M d l mpl t s occurn g ob t t n l hosp t l P d tn an p obl m n b t trical hosp t l Tr atm t d d re lt f the to æm as fp gn cy F br d e mpl cat n of bst trics. End re lt of perat p oced es o fibro d E d lt f d m d X ray t tme t f fibro ds. Som et l g al fa t rs cystoc l d rect cel H p t l r d a d manikin dem tr tio f b t tn l p r tio

POLYCLINIC HOSPITAL

Tuesday

A J Quimby—Demonstration of gastro intestinal fluoroscopy and roentgen therapy
J R Losee—Demonstration of pathological specimens in general and special surgical conditions. Discussion of chemical blood findings in diabetes and kidney diseases in relation to operative hazards

Wednesday

William Sharpe—Discussion of brain injuries and demonstration of operative procedures
K. W Ney—Ventricular estimation for determination of intracranial pressure. X-ray demonstration and operative clinic
A S Morrow—Operative clinic with local anæsthesia
J P Grant—General surgical operation
C. A McWilliams—Discussion of the principles of plastic surgery. Demonstration with patients and lantern slides
L D Cager—Consideration of the diabetic as a surgical risk

Thursday

L. J Ladin—Discussion of extrauterine pregnancy. Demonstration of the early signs of pregnancy
C G Child—Gynecological clinic
W Ward—Gynecological clinic
E L Kellogg I. C Keller H R Kutil and S L Cash—Gastrointestinal surgery. Operations and discussion of duodenal problems. Bile tract drainage. Lantern slide demonstration

Friday

D V St Clair V K Steese and Dr Reese—Urological clinic. Topography of the urinary tract and renal pelvis as shadowgraph bougie retrogram and pyelogram. Lantern slide demonstration

FLOWER HOSPITAL

Tuesday

H B Safford—9 Obstetrical clinic
C W Lutton—General surgery

Wednesday

V L Soresi—9 Demonstration Laboratory of Surgical Research
W F Hoxsey—General surgery
Dr Yoelin—Demonstration of unusual cases from the Department of Surgical Pathology

Thursday

F M Smith—9 General surgery
A L. Soresi—General surgery

Friday

J H Gibbs—9 Gynecological clinic
Eugene Carleton—Obstetrical clinic
O R V Bonnewitz—Roentgenology
L. M Flewell—Demonstration in surgical hæmatology

Daily

Demonstration Vanesthetic Local Surgical Laboratory for Surgical Research Department of Pathology Hæmatology and Bacteriology Roentgenology

METROPOLITAN HOSPITAL

Tuesday

J H Forbes and Staff—9 Management of pelvic infection in the female. Discussion of the results of curettage in septic abortion
C B Reed and H J Foltz—2 30 Pneumo-ventriculography in hydrocephalus
C I Bagg and Ralph Ward—3 30 Surgical clinic. Review of extrauterine pregnancy

Wednesday

Henry Safford—9 Demonstration of fractures of the pelvis complicating pregnancy
I S Loizeaux—2 30 The modern cæsarean operation

Thursday

J R Lisa—2 30 Duodenal ulcer as a complication of pelvic and tubal cultivation. Autopsy specimen
C S Harrington and staff—Compound fractures

Friday

William F Honan and staff—2 30 Demonstrations and operations under the various forms of local paravertebral and planchnic anæsthesia. Peripheral sympathectomy
S C Bleton—2 Urologic clinic
Wallace B House and A H Bingham—3 Transverse myelitis neurological and orthopedic clinic
G F Raynor G G Ornstein and M M Steinbach—4 Surgical interference in pulmonary tuberculosis

CITY HOSPITAL

Tuesday

Charles C Child Jr—11 Gynecological clinic
Howard D Collins—2 30 Abdominal operation
James Pederson—3 30 Genito-urinary clinic

Wednesday

Edward Pickham—1 Cystoscopical clinic
Parker Syms—2 3 General surgical clinic sacral anæsthesia

Thursday

Lyman W Crossman and John C Vaughan—11 General surgical clinic
Nathan W Green—2 30 General surgical clinic local and spinal anæsthesia
J Bayard Clarke—2 3 Genito-urinary clinic

Friday

Donald Gordon and Ernest A Campbell—11 Fracture clinic
Albert S Morrow—2 30 General surgical clinic

ST BARTHOLOMEW'S HOSPITAL

Tuesday

J M Lynch—8 30 General surgical clinic.

Wednesday

Austin Flint—8 30 Gynecological clinic.
A Crump—2 Medico-surgical cases

Thursday

J M Lynch—9 General surgical clinic
E. L Kellogg—2 General surgical clinic.

BETH ISRAEL HOSPITAL

Tuesday

ISADORE SEE—9 Pa t l al esthesia in emp ma
CHARLES GOODMAN and Staff— Ce ral ur g lcl n c
L. MOSCHOWITZ—2 I th l gy of append t
CHARLES C TTLIEB and DR TAYLOR—2 D n t t n f t r t g oe tg g am
DR SC L—3 K l um t t t cancer of tongu g t r l ses f t l

Wednesday

RICHARD LEWISOHN—9 Su gi l t atme t f ga tri l d od l ulce
HARRY F L ACS— Acute hæm rrh g p n re t t
H RY F I ACS and Staff— Gener l rm l cl n
RICHARD LEWISOHN and Staff—2 C al surg l l
M KAHN— I s l a li tarvin rgic l I het
DR I REISER— Fl o osc py of g tro- test n l t a t

Thursday

L J I n —9 D m t to f arly g f p eg cy D sc n f e t a terin p gn n y
MEYER R I I SON—10 Lantern l d d m trat ns of th p th l gical tomy f t b l p gn n
I C I LBI — 1 D gn t d ther pe t c v l of tri i fflati
HERMAN I RD R— P esentat o f es tre t l ith d um
L J I ADIN and Staff— Ge l rg cal l c

Friday

ABR. AM I W LBAR T—9 I h b t f mod ls d m n trat g p th logi l les o f th rum nt m d est l ph et

BETH DAVID HOSPITAL

Tuesday

LEO BUERGER—9 Urol g c l tuic

Wednesday

JU ILS JARC O—9 Obst tri l l ic
I EO BLER ER— U l l h
CH LES C TTLIEB— A y l c

Thursday

L MILLER KAI N—9 C l g y
MAX R NTE — Cy l l in

Friday

L UI DR SIN—9 Obst trical l
I J LAD N— Cy l l

MISERICORDIA HOSPITAL

FRA CIS F BUTLER—O th ped el E l res lt f pera t tm nt pel my l t
JOSEPH A D VEI —Ope t d dem str t f pel c tum es
ANTHO Y H HA C N—C ll bl dd d t m ch c
LDV DF K LB E—S pern m v u t the t p p g Sympt m t l gy u th l nd l leul
WI LI M W M VE D m t at by X y flm f typ l
P BI C Sc t NE Ca al fi d g e te d th t l bo t ry m t f ppa d es
ALEX ND R H Sc ITT Cmpl t f p h ll bo m m t d d es lt

ROCKEFELLER INSTITUTE

ALEXIS CAR EL and ALBERT H FIELD—Cin mato- gr ph d m n trat n f t ue growth
JAM S B MUR Y—I perim t l n aly f th act o of A r y n c ce
W DF H BROW LOUIS B I RER and C M VAN ALLEN—Th rel t f th thyro d to th mal mancy of t pl ted neoplasm
HIDEYO NOGUCHI—A ll w f er
I FYT N KOLS—Phy logi l mpl c t o in chol l th asis.

KNICKERBOCKER HOSPITAL

Wednesday

JOHN DOUGLAS C A FRINK C C BURDICK J A BOI RER A S ARMSTRONG and C A KOENIG—9. I d res lts f h l j n

Thursday

JOHN DOUGLAS C A FRINK C C BURDICK J A BOI RER A S ARMSTRONG and C A KOENIG—9 Ge r l gical ope t tra mat a d m rg ncy ca es

Friday

JOHN DOUGLAS C A FRINK C C BURDICK J A BO RER A S ARMSTRONG and C A KOENIG—9 I d res lt in comp l cat l l g fra t re

FORDHAM HOSPITAL

Tuesday

F FLY N a l taff—9 C ral rgery
A H H RRIC l taff— C r l urgery

Wednesday

J H KE o l t ff—9 C e l urgery
J R CLA d taff— C nc l gery
J H FIT l t ff— Obst tri l l nic

Thursday

ALEXAN R NICOLL nd t ff— G l gery

Friday

S W BOG RTEIN and t ff—9 O th pe l clin c
I I W LST d taff— Ge ral rgery

BRONX HOSPITAL

Tuesday

MA. ROSENTH L and t ff— Tra hyl pl t opera t h t t my tc
MARTI I LIN nd t ff— 30 Operat th A l t pel c g s d loc l a d sa ral rsth

Thursday

A A BER l t ff— G tro-ent l g l lin c

Friday

H C and t ff—4 Cy logi l lin

MANHATTAN MATERNITY HOSPITAL

J C F G A FLI T and Wi M M FORD—9 l ly D m t at f ndoo d td r serv ce I t yr l nd fl g y t m urs g c l rv d p n t l thod p t g room t hn q e

LEBANON HOSPITAL

Tuesday

A J Ronga—9 Gynecological clinic
C Seligman—2 3 Cyn logical l nic
Ralph Waldo— o Gynecological clinic

Wednesday

Henry Roth—9 30 Surgical clinic
L Miller Kahn—9 30 Surgical clinic

Thursday

A J Ronga—9 Gynecological clinic
C Seligman—2 30 Gynecological clinic
Ralph Waldo—2 30 Gynecological clinic

Friday

Henry Roth—9 30 Surgical clinic
L Miller Kahn—9 3 Surgical clinic

WORKHOUSE HOSPITAL

Wednesday

Edward C Brenner—9 Cystoscopic clinical clinic

Thursday

Edward C Brenner—9 Discussion of the clinical symptomatology demonstrating the surgical pathology frequently found in drug addicts with the treatment indicated in literature

PENITENTIARY HOSPITAL

Tuesday

Edward C Brenner—9 Practical demonstration in surgical pathology clinic and dressing under local anæsthesia

ITALIAN HOSPITAL

Tuesday

C Savini and V Tanoni—9 General surgery
V Sellaro and V Scaturro— Gynecology

Wednesday

F E Parodi and C M —9 Cystoscopy

Thursday

S Salado and D V —9 Clinic
D Petillo and M Casso— Cystoscopy

Friday

V Cuzzi and C T —9 Cystoscopy

BROAD STREET HOSPITAL

Walter M Brickner, Wallace Crum, J Richard Kevin, Robert T Morris, Willard Scheed, Jr, and Ralph Stewart—Operations demonstrating all bed dec in intramuscular surgery
Maximilian Stern—Urological specimens and cystoscopic demonstrations

FRENCH HOSPITAL

J P H —I l lt g tr g
Percy K Turnbull—Results of pe t and X ray treatment of sarcoma of the lungs

LYING-IN HOSPITAL

Staff—Obstetrical operations demonstrations from interesting cases each afternoon
J T Gwathmey—Demonstration of obstetrical analgesics
J R Lo fe—Demonstration of interesting pathological specimens in the museum

COUNTERNEUR HOSPITAL

Tuesday

A E Sellenings—2 Surgical clinic

Wednesday

W H W Knipe— Demonstration of normal and abnormal obstetrical cases
L J Ladin—3 Gynecological clinic

Thursday

A E Sellenings— Surgical clinic.

Friday

F L Kellogg— Surgical clinic

ST MARY'S HOSPITAL

Tuesday

Staff—9 Malformations and deformities in children Demonstration of non-operative cases specimens etc

Friday

Staff—9 General surgical clinic

HARLEM HOSPITAL

Wednesday

Thomas Cherry—10 Radium in gynecology
J N F Connors— Intestinal obstruction
Henry S Pascal—2 Biliary tract

Friday

Thomas Cherry and Arthur Stein— Gynecological operations and demonstration
John J Connors and Perry S Boynton—2 Treatment of fractures

HOSPITAL FOR JOINT DISEASES

Henry W Frauenthal and associates—Demonstrations of cases following tendon grafting dartrotis Case of congenital dislocation of the hip cured and under treatment Case of fracture of the patella treated by massage electricity and muscle education

ST MARK'S HOSPITAL

Tuesday

Benjamin T Tilton—3 Surgical clinic

Wednesday

Victor C Pedersen—1 Urological clinic

Thursday

William A Wilson— Gynecological clinic

CLINICS IN BROOKLYN HOSPITALS

BROOKLYN HOSPITAL

Tuesday

W. A. Sherwood and J. H. L[illegible]—9. Clinical and pelvic operations.
R. W. Westbrook—9. General gynecological operations.
Mary H. Combs—9. Demonstration in social service department.
N. P. Rathbun and Staff—Clinic for women.
G. H. V. Hunter and Donald McKay—2. Other pelvic operations.
J. Hyg. Jenni[illegible]—Dry lab[illegible] cases for check[illegible] dent[illegible] relationship[illegible] effect.
Sidney Smith—3. Demonstration at [illegible] of radium in gynecological cases.

Wednesday

Jo[illegible] F. Je[illegible] and K. Tan[illegible]—9. Clinical bloodless surgery.
R. H. P[illegible] and Staff—9. Gynecological and obstetrical.
N. I. Rat[illegible] and Staff—9. Demonstration [illegible] cystoscopy, urography, dermatological [illegible] treatment.
Ruth Ingraham—Nursing [illegible] demonstration.

Thursday

W. A. Sherwood and J. H. L[illegible]—9. Clinical [illegible].
W. H. C[illegible]—9. Demonstration [illegible].
C. H. V. Hunter and Donald McKay—9. Orthopedic.
H. A. Fis[illegible]—9. Syphilis, pyelitis, salpingitis, femoral phlebitis, follow-up.
N. P. Rathbun and Staff—Gen[illegible] to-[illegible].
C. L. B. Coulter—Demonstration [illegible].
W. H. Field—Demonstration [illegible].

Friday

John F. J[illegible]—Lecture [illegible] and surgery of the thyroid.
N. P. Rat[illegible] and W. F. McKee—9. Urological.
W. A. Sherwood and Staff—Surgical staff [illegible] (with [illegible]).
W. A. Sherwood and Staff—Diagnostic [illegible] surgical outpatient and dispensary.

LONG ISLAND COLLEGE HOSPITAL

Tuesday

John O. Polak, Alfred Beck and Staff—9. Gynecological and obstetrical clinic.

Wednesday

Emil Goetsch—9. Gonorrhea, demonstration and treatment.
S. Pott Bartle—9. Ear, throat.
R. F. T. Barber—Demonstration of nose.

Thursday

John O. Polak, Alfred Beck and Staff—9. Gynecological and obstetrical clinic.
Henry H. Morton, Homer L. Fraser and Staff—3. Genito-urinary clinic.

METHODIST EPISCOPAL HOSPITAL

Tuesday

Thomas B. Spence, Henry F. Graham, Charles H. Goodrich and H. T. Langworthy—9. General surgical clinic.
O. J. Humpstone and Staff—9. Obstetrical clinic.

Wednesday

W. H. Bogart and Roger Durham—9. General surgical clinic.
O. J. Humpstone and Staff—9. Obstetrical clinic.
I. B. Smith—9. Pathological [illegible].
Wesley H. Wallace—9. X-ray treatment.
J. C. Graham—9. Radium treatment.

Thursday

Thomas B. Spence, Henry F. Graham, Charles H. Goodrich and H. T. Langworthy—9. General gynecological.
O. J. Humpstone and Staff—9. Obstetrical clinic.
Wesley H. Wallace—9. X-ray treatment.
J. C. Graham—9. Radium treatment.

Friday

Russell S. [illegible]ler and Harold K. Bell—9. General [illegible].
O. J. Humpstone and Staff—9. Obstetrical clinic.

KINGS COUNTY HOSPITAL

Tuesday

F. H. Tis[illegible]—9. General [illegible].
Henry M. M[illegible]—Demonstration [illegible] obstetrical [illegible].
Hermer Fr[illegible] and C. A. S. Cochran—Gynecological [illegible] and demonstration [illegible] cases.

Wednesday

William Pfeiffer—9. Chronic [illegible].
Franklin B. Van Wart—Demonstration [illegible] pediatric [illegible].
Lipe C. William—Demonstration [illegible] pediatric [illegible].

Thursday

Joseph Tyrrell—9. Demonstration [illegible] three times [illegible].

Friday

R[illegible] M. R[illegible]—9. General surgical [illegible].

U. S. NAVAL HOSPITAL

Tuesday

Captain N[illegible] J. Blackwood and Staff—Clinic [illegible].

Thursday

Captain Norman J. Blackwood and Staff—Roentgenological [illegible] demonstration.

Friday

Captain Norman J. Blackwood and Staff—Demonstration [illegible] army and [illegible] practice.

ST MARY'S HOSPITAL

Tuesday

W. V. PASCUAL and T. M. BRENNAN—9 General surgical clinic
J. C. WILLIAMS—12 X-ray therapy high voltage treatment with demonstration of roentgen quantimeter measurement of dosage
R. B. ANDERSON—3:30 Urological operations under caudal and transacral anæsthesia

Thursday

W. V. PASCUAL and T. M. BRENNAN—9 General surgical clinic
J. G. WILLIAMS—12 X-ray therapy high voltage treatment with demonstration of roentgen quantimeter measurement of dosage
X. L. ZIMMERMAN—2 Emergency obstetrical operations
SURGICAL STAFF—Dry lab. general surgery

Friday

J. R. KEVIN and J. P. MURPHY—9 General surgical operations
J. G. WILLIAMS—12 X-ray therapy high voltage treatment with demonstration of roentgen quantimeter measurement of dosage
J. C. MACFEE and J. P. GLYNN—2 Gynecological clinic

ST JOHN'S HOSPITAL

Tuesday

H. BEECKMAN DELATOUR—9 General surgery
STANLEY B. THOMAS—2 General surgery

Wednesday

GEORGE F. SIMMIS—9 General surgery
ALFRED W. WHITE—2 Obstetrics

Thursday

WILLIAM H. RANKIN—9 General surgery
HAROLD K. BELL—General surgery

Friday

WARREN L. DUFFIELD—9 General surgery
JOHN C. KEPP—Roentgenological demonstration

CUMBERLAND HOSPITAL

Tuesday

WILLIAM L. HEEVE—9 General surgical clinic
WILLIAM C. DURRIN—2 Gynecological clinic

Wednesday

JOHN F. RANKEN—9 General surgical clinic
FREDERICK R. MEEKS—Gynecological clinic

Thursday

HERBERT S. DUCRET—9 General surgical clinic.
MARCUS F. SERRE—2 Gynecological clinic

Friday

ROBERT L. WOOD and GEORGE S. OGDEN—9 Obstetrical clinic

ST PETER'S HOSPITAL

Tuesday

JOSEPH F. TODD—8:30 Diagnostic and operative gynecological clinic
GORDON GIBSON—10:30 Diagnostic and operative clinic prolapsus uteri
J. STURDIVANT READ—3 Diagnostic and operative urological clinic

Wednesday

THOMAS M. BRENNAN and WM. M. FANNIS—8:30 Diagnostic and operative clinic demonstrations

Thursday

FREDERICK C. PAFFARD and JAMES J. SHAY—8:30 Diagnostic and operative clinic surgery of the upper abdomen
JOHN D. RUSHMORE and LORNE McD. RYAN—3:30 Diagnostic and operative clinic general surgery

Friday

GORDON GIBSON—3:30 Demonstration and operative clinic prolapsus uteri

WYCKOFF HEIGHTS HOSPITAL

Tuesday

JOHN L. BAUER—9 General surgical clinic
RUSSELL S. FOWLER—2 General surgical clinic

Wednesday

JOHN HORT and ARMIN J. SIBBEL—9 General surgical clinic
CHARLES J. PFLUG—2 General surgical clinic

Thursday

JOHN L. BAUER—8 General surgical clinic
RUSSELL S. FOWLER—General surgical clinic
THURSTON H. DEXTER—2 Pathological conference
RUDOLPH F. HERRMAN—3 Obstetrical clinic

Friday

JOHN HORT and ARMIN J. SIBBEL—9 General surgical clinic

BUSHWICK HOSPITAL

Tuesday

W. E. LIPPOLD and M. B. BERGMANN—9 Gynecological clinic operations
A. M. JUDD or PHILIP E. SMITH—Gynecological clinic operations
JOSEPH B. L. EPISCOPO—2 Orthopedic clinic.

Wednesday

GEORGE H. REICHERS and A. V. P. FARDELMANN—9 General surgical operations
NATHAN ADLER, WILLIAM C. JAYNE, ISIDOR TEPLITZ—2 Obstetrical clinic

Thursday

RUSSELL M. ROME and HECTOR W. BENOIT—9 General surgical operations
GERARD KASPER and HARRY LIPTON—11 General surgical operations

Friday

RICHARD C. WEITHAS and GEORGE H. PALMER—Genito-urinary clinic

ST CATHERINE'S HOSPITAL

Tuesday

DANIEL A. MCAULIFFE—9 Clinical surgery
DAVID CLARKE BROOKS—Clinical surgery

Wednesday

JOHN F. CHEEVER—9 Clinical surgery
JOHN M. SCANLAN—9 Clinical surgery and anaesthesia
demonstrations of the value of blood transfusion method
applications and intravenous method
MARTIN L. BOEKER—Proctologic clinic
MICHAEL MCGRATH AND HUGH NOLAN—Pathological
demonstrations

Thursday

FRANCIS D. JEROME AND DAVID M. MARION—General
surgery
CHARLES A. CORDES, EDWARD A. FLEMING AND JOSEPH
A. DECOSTA—Gynecologic clinic

Friday

DANIEL A. MCAULIFFE—General surgery
JOHN M. SCANLAN—Clinical surgery and anaesthesia
DAVID GEORGE BROOKS—General surgery

JEWISH HOSPITAL

Tuesday

JOHN LEAR—General surgical clinic
LOUIS SCHWARTZ—Gynecologic clinic
MAX LEDERER—Pathologic laboratory

Wednesday

WILLIAM FITCH—Clinical surgery and anaesthesia
Demonstrations of value of method of local anaesthesia
ADOLPH BUTLER—Gynecological clinic
MILTON WEICH—Location and localization

Thursday

JOHN LEADER—Clinical surgery and anaesthesia
LOUIS SCHWARTZ—General laboratory
MAX LEDERER—Pathological laboratory

Friday

WILLIAM LINDE—General surgical clinic

CONEY ISLAND HOSPITAL

Tuesday

VICTOR A. BERTRAM—Gynecological clinic
Illustrating the importance of the menstrual function
during the pregnancy, labor and puerperium
Illustrating the importance of the menstrual function
during the pregnancy, labor and puerperium

Wednesday

JOSEPH A. BLAKE—Gynecological clinic

BROOKLYN CANCER RESEARCH HOSPITAL

Tuesday

WILLIAM FRANCIS CASTELLO AND THOMAS J. MORTON
JR. AND PHILIP VAN WYCK—Clinical
Clinical demonstrations of the method of treatment
of cancer by the method of electrocoagulation

LUTHER MEMORIAL HOSPITAL

Tuesday

JOHN J. LANKEN—General surgical and gynecological
clinic
ROBERT WOOD—Obstetrical clinic

Wednesday

WILLIAM PFEIFFER—Obstetrical clinic
GEORGE H. TYLER—General surgical clinic

Thursday

THEODOR VOSBURGH—General surgical clinic
ONSLOW A. CORDON JR.—Obstetrical clinic

Friday

CHARLES CHERRY—General surgical clinic.

NORWEGIAN HOSPITAL

Tuesday

F. H. FERRIS—8.30 General surgery

Wednesday

HENRY L. CRAIG—8.30 Clinical surgery

Thursday

F. W. SKELTON—8.30 General surgery

Friday

LOUIS STOREN—8.30 General surgery

HOLY FAMILY HOSPITAL

Tuesday

JAMES M. DUNN—General surgical clinic
EDWARD MOORE—Gynecological clinic

Wednesday

WILLIAM LEFFERTS—General surgical clinic

Thursday

EDWARD H. LEE—General surgical clinic.

GREENPOINT HOSPITAL

Tuesday

ANGELO L. SORTINO—Clinical surgical clinic

Wednesday

CHARLES A. CORDON—Gynecological clinic
JOHN M. SCANLAN—General surgical clinic

Thursday

JOHN M. SCANLAN—General surgical clinic

Friday

CARLOS A. CORDON—Gynecological clinic

HOUSE OF ST GILES THE CRIPPLE

Thursday

WILLIAM S. HUBBARD, FRANCIS LYNE CLEVELAND
NAPIER LAMB, ROBERT JACQUES CUSHMAN—
Demonstrations of orthopedic cases

MIDWOOD SANITARIUM

Tuesday

BURT D. HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

Wednesday

BURT D. HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

Thursday

BURT D. HARRINGTON and CAMERON DUNCAN—Gen eral surgery and gynecology

Friday

BURT D. HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

TRINITY HOSPITAL

Thursday

WILLIAM FRANCIS CAMPBELL and HOWARD TAYLOR—Central registration

UNITY HOSPITAL

Tuesday

A. M. JUDD Interesting gynecological operations
ONSLOW CARSON Jr. Operations during pregnancy

Wednesday

GEORGE I. MILLER Several cases of local transfusion Demonstration of direct blood transfusion instrument Abdominal operations

Thursday

RALPH M. BEACH Treating gynecological operation

Friday

GEORGE I. MILLER Operation on the gastro-intestinal tract Direct blood transfusion

ST. CHRISTOPHER'S HOSPITAL

Tuesday

HERBERT C. FETT—8 Orthopedic clinic

SURGERY OF THE EYE, EAR, NOSE AND THROAT

CLINICS IN NEW YORK HOSPITALS

NEW YORK EYE AND EAR INFIRMARY

Tuesday

CLYDE L. McDONNALD, GEORGE H. BELL, CHARLES W. B. DOHERTY, W. R. BEDING and J. A. RENWICK, KELLY COYLE, DAVID L. MILTON—Clinical. Mastoid treatment and following up
CONRAD BERENS—10 Laboratory demonstrations of intraocular and orbital tumors
STAFF—Otological clinic and diseases of throat
GEORGE H. BELL—2 Operating theatre
CLYDE L. McDANNALD—2 Reese resection for stabismus. Reese ptosis operation. Extirpation of malignancy
CONRAD BERENS—Subconjunctival injections for trachoma. Intubation for stricture of lacrimal duct. Advancement of external rectus muscle. Reese ptosis operation. Extirpation of malignancy
ROBERT LEWIS, JAMES McCOY and assistants—2 15 Otological clinic
THE STUDENTS' assistants—5 Otological inspection

Wednesday

ROBERT C. BEN, B. WEEKS, MORTON SMITH, KELLY COYLE, A. B. REESE, MILTON WEEKS, B. BRUNSCHWIG and J. A. RENWICK—Eye clinic. Mastoid treatment and following up
CHARLES DAVIS—Extraocular foreign bodies. Instruments and glass eye
STAFF—Otological clinic and diseases of throat
ROBERT C. BEN and MORTON SMITH—Cataract extraction with peripheral Keese resection for stabismus. Keese ptosis operation. Intramuscular conjunctival injection for trachoma. Modified treatment with gold ball implant. Correction with Keese knife. Extirpation of complicated cataract. Intubation of lacrimal duct
EDWARD WARREN—5 Otological. Lecture. Demonstrations—5 Otological operations

Thursday

JOHN M. WHEELER, WEBB WEEKS, J. H. DENNINGTON, R. L. DUREE and A. B. REESE—10 Eye clinic. Mastoid treatment and following up
STAFF—Otological clinic and diseases of throat
JOHN M. WHEELER—2 Operations for complicated orbital and cranial injuries
WEBB WEEKS—Trephining for chronic glaucoma. Keese for strabismus
JOHN McCOY and assistants—2 5 Otological clinic
ROBERT LEWIS, JOHN McCOY and assistants—2 15 Otological operation

Friday

FRANCIS WHITE, BERNARD SAMUELS, R. L. DUREE and A. B. REESE—10 Eye clinic. After treatment and following up
B. SAMUELS and M. L. BERLINER—Demonstration of Cultured Staphylococcus. Van Hess differential pupillometer and Koeppe ophthalmoscope
C. S. DIXON—Localization of foreign bodies in the globe
STAFF—Otological clinic and diseases of throat
H. C. WHITE—2 Mastoid operations
BERNARD SAMUELS—2 Keese resection for strabismus. Keese ptosis operation
CHARLES DAVIS—Assistants—2 15 Otological clinic
FREDERICK WHITE, JAMES McCOY and assistants—2 5 Otological operation

CORNELL UNIVERSITY MEDICAL COLLEGE

Tuesday

BERNARD SAMUELS, CHARLES A. DUNNAN and MORTON L. BERLINER—Ophthalmological clinic. Demonstration of Cultured Staphylococcus

Friday

ROBERT C. KELLY, JOHN E. WEEKS and VALDEMAR CRITT—Ophthalmological clinic

MANHATTAN EYE EAR AND THROAT HOSPITAL

HARRISON SMITH SAMUEL M CULLAGH J J DALLAS FRANCIS J MACKENTY—Rhinological cases
EDGAR TRUSO CHARLES KENNEY JOHN STAVSON and HERBERT WOLFF—Ophthalmological cases
ARTHUR DELL JOHN F J RUSSELL and WENDELL PHILLIPS—Otological cases
FREDERICK IRWIN—Roentgenological demonstration
GUILFORD ROBBINS—Radium treatment of disease of the skin
A A FRANCISCO—Ophthalmological cases
C J IMPERATRI—Therapeutic hypnosis
H A HUNT—Rhinological demonstration of the serological cases
STAFF—Daily Radiodescopic demonstration of interesting cases

CITY HOSPITAL

Wednesday

DANIEL S DARLINGTON—30 Otolaryngological clinic postoperative follow up

Thursday

WILLIAM WHITE FRANCIS—3 Ophthalmological

Friday

DANIEL H WILLNER and PERRY BARTLETT HOUGH—3 Ophthalmological

ST VINCENTS HOSPITAL

Tuesday

FRANCIS J QUINN—Hobbies of children the treatment

Wednesday

JOSEPH O CONNELL—Operative plastic of the scalp

METROPOLITAN HOSPITAL

Wednesday

C C BOYLE—Tuberculosis of the cervical glands Radiological
J J TYTLER—33 Rhinological and laryngological clinic

BETH DAVID HOSPITAL

Tuesday

S J KOPETSKY—Otological

FIFTH AVENUE HOSPITAL

Wednesday

L F HETRICK—Otological
WESTLEY M HUNT—Rhinological and laryngological clinic

Friday

DEWANE HALLETT—9 Ophthalmological
HAROLD LOTE—Laryngological
JOHN W WHEELER—Ophthalmological clinic

BELLEVUE HOSPITAL

Tuesday

J D KERNAN—1 Bronchoscopic tumor of the gallbladder resus external urgery with bibliotechnique deposits of cases
STAFF—Nose and throat clinic Foreign bodies dressings demonstration of interesting cases
J WOLFF—Daily clinic After time and follow up
S AGATSTON—Daily clinic Recess operation
C C COAKLEY and associates—2 Earnose and throat clinic

Wednesday

J W LOVELESS—1 Demonstrating the Bellevue method of injection of the larynx Presentation of cases years after operation showing results
STAFF—Nose and throat clinic Rounds dressings demonstration of interesting cases
S AGATSTON—Eye clinic After treatment follow up
C C COAKLEY and associates—2 Ear nose and throat clinic
C H MAY—2 Advancement operation

Thursday

R T ATLEE—External operation on the paranasal sinuses the presentation of cases
STAFF—Nose and throat clinic Rounds dressings demonstration of interesting cases
C H MAY—Eye clinic After treatment and follow up
C C COAKLEY and associates—2 Ear nose and throat clinics
J W LEE—Cataract extraction with safety flap

Friday

WILLEY C BOWERS—10 Radical operation of mastoid with demonstration of importance of hearing rather than lessening persistent infection of case
STAFF—Nose and throat clinic. Rounds dressings demonstration of interesting cases
W B DOHERTY—Laryngeal clinic After treatment and follow up
W B DOHERTY—Intubation with implantation of rubber
C C COAKLEY and associates—Ear nose and throat clinics

POLYCLINIC HOSPITAL

Thursday

F M STEPHENS J M SMITH T D NEER GEORGE E DAVIS and C R FAULKNER—Radical mastoid operation for chronic suppurative mastoiditis Demonstration urethroscopic operation of the cadaver Pathological tissues of the nasal labyrinth diseases. Demonstration of operation the cadaver

Friday

C H BELL J A KEARNEY and C E MCDONALD—Eye clinic Demonstration of selected clinical cases deposit

ST MARYS HOSPITAL

Wednesday

STAFF—9 Tonsillectomies

NEW YORK POST GRADUATE HOSPITAL

Tuesday

T J HARRIS—1 30 Nose and throat clinic
W C MCFARLAND—2 30 Ear clinic
MARTIN COHEN—3 30 Eye clinic Ptosis operation Hebrath knife operation extirpation of lachrymal sac bilateral advancement Elliots trephining operation cataract extraction

Wednesday

DUNCAN MACPHERSON—1 30 Nose and throat clinic
R L LOUGHRAN—2 30 Ear clinic
A E DAVIS—3 30 Eye clinic

Thursday

T J HARRIS—30 Nose and throat clinic
W C MCFARLAND—30 Ear clinic
MARTIN COHEN—3 30 Eye clinic

Friday

DUNCAN MACPHERSON—3 Nose and throat clinic
R L LOUGHRAN—2 3 Ear clinic
E M ALGER—3 3 Eye clinic

ST LUKE'S HOSPITAL

Tuesday

E B DENCH—2 Ear clinic demonstrations of cases

Wednesday

A P VOISLAWSKY W M HUNT M H MERRIMAN and L T PERRAULT—2 30 Operative nose and throat clinic

Thursday

A P VOISLAWSKY W M HUNT M H MERRIMAN and L T PERRAULT—2 Results of intellectual myopia
F B DENCH and staff—2 15 Otological operations.

LENOX HILL HOSPITAL

RUDOLF C DEIG and staff Treatment of fresh eye burns Operations on the eye
ERNST F KRUG and staff Study of after-cataract cases with the Gullstrand lamp
FELIX COHN and staff Oto-laryngological clinic
JOHN D KERNAN and staff Bronchoscopic treatment of lung abscess

FORDHAM HOSPITAL

Tuesday

CHARLES GRAEF and staff—Ophthalmology

Thursday

W M DUNNING S H BASCH and staff—9 Oto-laryngology

FLOWER HOSPITAL

Tuesday

L E HANCOCK—9 Otological clinic
L S MCKEE—Ophthalmological clinic

KNAPP MEMORIAL EYE HOSPITAL

ARNOLD KNAPP and Associates—Daily Operations on the eye Demonstrations of cases

MT SINAI HOSPITAL

Tuesday

S VANKAUER—2 Operative nose and throat clinic bronchoscopy

Wednesday

J WOLFF—Cataract extraction with conjunctival safety flap
K SCHLIVEK—Plastic operation for ectropion
C BAUER—2 Demonstration of block anæsthesia of the ciliary plexus
J GOLDSTEIN—Extirpation of lacrimal gland

Thursday

S VANKAUER and staff—2 Bronchoscopies and œsophagoscopies

Friday

S VANKAUER and staff—2 Nose and throat operations

Daily beginning October

ISADORE FRIESNER and staff—Otological clinic

ITALIAN HOSPITAL

Wednesday

M LOMBARDO and T R PAGANELLI—2 Eye clinic

Friday

S LEVY and J PAGANELLI—2 Ear nose and throat clinic

LEBANON HOSPITAL

Friday

M D LEDERMAN and I M HELLER—2 30 Oto laryngological clinic

GOUVERNEUR HOSPITAL

Tuesday

W W CARTER—Plastic operations for nasal deformities Bone transplantation for nasal deformities

HARLEM HOSPITAL

Thursday

L M HUBBY—10 Tonsillotomy Modified radical mastoid operation

BETH ISRAEL HOSPITAL

Friday

S J KOPETZKY—9 Pathology of middle ear infections
A L SCHWARTZ—10 Cases of hyperinthecic disease
FELIX COHN and staff—2 Oto-laryngological clinic
S J KOPETZKY and staff—3 Otological clinic

KNICKERBOCKER HOSPITAL

Tuesday

J EDGAR WELCH—3 Tonsillotomies

NEW YORK INFIRMARY FOR WOMEN AND CHILDREN

Friday

ANNA BELCHER—2 Nose and throat clinic

ST MARK'S HOSPITAL

Thursday

G J E TIECK—30 Operations for nasal deformities

CLINICS IN BROOKLYN HOSPITALS

BROOKLYN EYE AND EAR HOSPITAL

Tuesday

FREDERICK BRADLEY and J. J. MADDEN—2 Demonstration of the Gullstrand Lampa Iconometer

Wednesday

GEORGE E. DEELY—2 Operations for squint cataracts etc.

Thursday

W. C. BARRETT—Radium therapy

Friday

CLAUDE G. CRANE—Demonstration of Brown-Adson method of the withdrawal of cases

LUTHERAN HOSPITAL

Tuesday

ALEXANDER CALLIGAN—9 Submucous resection nasal septum tattooing and procaine potassium local laryngeal anesthesia

Wednesday

ALEXANDER GILLIGAN—9 Tonsillectomy and adenoidectomy local diagnosis and treatment Sinus therapy

Thursday

ALEXANDER CALLIGAN—9 Correction of deformities of the nose Submucous resection

Friday

ALEXANDER GILLIGAN—9 Intranasal treatment of the maxillary antrum

BROOKLYN HOSPITAL

Wednesday 3 p.m.

C. G. CANFIELD, H. LAWSON and J. M. TAYLOR—3 Operations Bronchoscopy Demonstration of the œsophagus Operative bronchoscopy

CONEY ISLAND HOSPITAL

Thursday

LEFFERTS A. MCCLELLAN—Special gynecological diagnostic tests Demonstrations of the technic of minor surgical procedures

KINGS COUNTY HOSPITAL

Wednesday

JOHN W. DURREE—Otological Demonstrations to Junior Class

ST. CATHERINE'S HOSPITAL

Tuesday

C. G. FISHER—Ear nose and throat

Wednesday

S. H. DECOSTE—Ear nose and throat

Thursday

C. G. FISHER—Ear nose and throat clinic

Friday

G. C. FISHER—Ear nose and throat clinic

WYCKOFF HEIGHTS HOSPITAL

Friday

ROBERT L. MOORHEAD and HARRY MEYERSBURG—Nose and throat clinic

PECK MEMORIAL HOSPITAL

Tuesday

J. ALEXANDER STEWART—Nose throat clinic

Wednesday

ROYAL W. ABBOTT—9 Nose and throat clinic

U. S. NAVAL HOSPITAL

Wednesday

CAPTAIN NEWMAN J. BLACKWOOD at St. —Eye ear nose and throat disease

ST. PETER'S HOSPITAL

Tuesday

EDWARD R. DORNEY—3 Nose and throat clinic

HOLY FAMILY HOSPITAL

Friday

GEORGE E. DEELY—9 Ear nose and throat clinic

CUMBERLAND HOSPITAL

Tuesday

J. A. STEWART—3 Nose and throat clinic

Friday

R. W. ABBOTT—Nose and throat clinic



Fig 3 Pyelogram of left kidney showing distended renal pelvis (left) as contrasted with the right kidney which is practically blocking but which indicates pathological condition

per 100 cubic centimeters uric acid 2 9 milligrams per 100 cubic centimeters creatinin 1 54 milligrams per 100 cubic centimeters chlorides 565 milligrams per 100 cubic centimeters hippuric negative

Repeated examinations of the stool disclosed neither parasites nor ova

The urine was always very milky in appearance slightly more so in the morning than throughout the day It never showed a reddish tinge although the microscope disclosed the presence of red blood cells Urinalysis gave the following findings

Reaction acid color cream odor none specific gravity 1 014 1 017 appearance milk like emulsion protein 0 84 grams per liter mucin present glucose negative indican negative cholesterol trace acetone negative diacetic acid negative beta-oxybutyric acid negative

Urinary fat Grease spot test positive etherization clear (oil extracted) (Fig 1 frontispiece) Babcock test fat 0 45 to 0 per cent

The microscopic examination of the urine was negative as shown by the following report Red blood cells small number white blood cells numerous bacteria occasional large gram negative bacillus no tubercle bacilli smegma no filaria hooklets or ova no casts

The X ray examination of the urinary tract was negative The X ray examination of the chest showed some peribronchial thickening but a whole the chest examination was negative

First cystoscopy July 6 The cystoscope passed easily There was no residual urine and the bladder urine was similar to the voided specimen The bladder capacity was 5 cubic centimeter There was no stone tumor ulcer sinus or diverticulum in the bladder The mucous membrane showed a mild generalized hyperæmia The ureteral orifices were normal similar in form and showed no localization of the general hyperæmia The ejaculation from the right ureter was clear in appearance while that of the left side was creamy white The sphincter margin was normal in outline and showed no relaxation The catheters passed easily to each renal pelvis and there was no retention on either side As the specimen of urine from the right ureter was clear and that from the left was creamy white the impression was that we were dealing with a chyluria left renal in origin (Fig 2 frontispiece) The specimen from the right kidney showed no infection The left kidney showed a colon bacillus infection

URINALYSES OF URETERAL SPECIMENS

	Right kidney	Left kidney
Color	Cl ambe (Fig)	Cre my h t (Fig 2)
Re ct	Acid	Acid
Sug r	\	\
Blood	\	\o
	(Mi rosc p)	(Mi osc p)
Bil	\o	\ e
Mi osc p xam t		
Red blood c lls	Few	\ m o
White blood cells	Occ n l	Few
Cast	\	\o e
Crystals	\	\ e
Bacteria	\	*Few l g b ll*
Tubercle b ll	\ n	\ e

Diff re t l f ct l t t s b t m te ph l lph phthal t a ly

	Right kidney (Dye ml)	Left kidney (Phenolsulphonephthalein)
Tot l app e n	4 5 m tes	3 mi tes
Out put first mi tes	7 per nt	13 per nt
Obt ned fr m bladd t d f mi tes		5 p nt
First mi tes t tal utp t		5 per ent

The patient s apprehension made it impossible to prolong the test The secretion from the right kidney was just as heavy as that from the left but not nearly as frequent We concluded therefore that the bladder contents represented an extracatheter flow from the right kidney

Pyelogram The distention of the left renal pelvis required the injection of 7 cubic centimeters of the solution The pyelogram (Fig 3) is atypical as the minor calyces are practically lacking but we did not believe this betoken d a pathological condition

A second cystoscopic examination on July 8 at which time the above functional test was carried out showed the same conditions as those found on July 6 By this time that of the second cystoscopy the infection of the chyluria side (left) had been cleared up by antiseptic

In the few cases previously reported some of the authors tried various procedures in an effort to vary

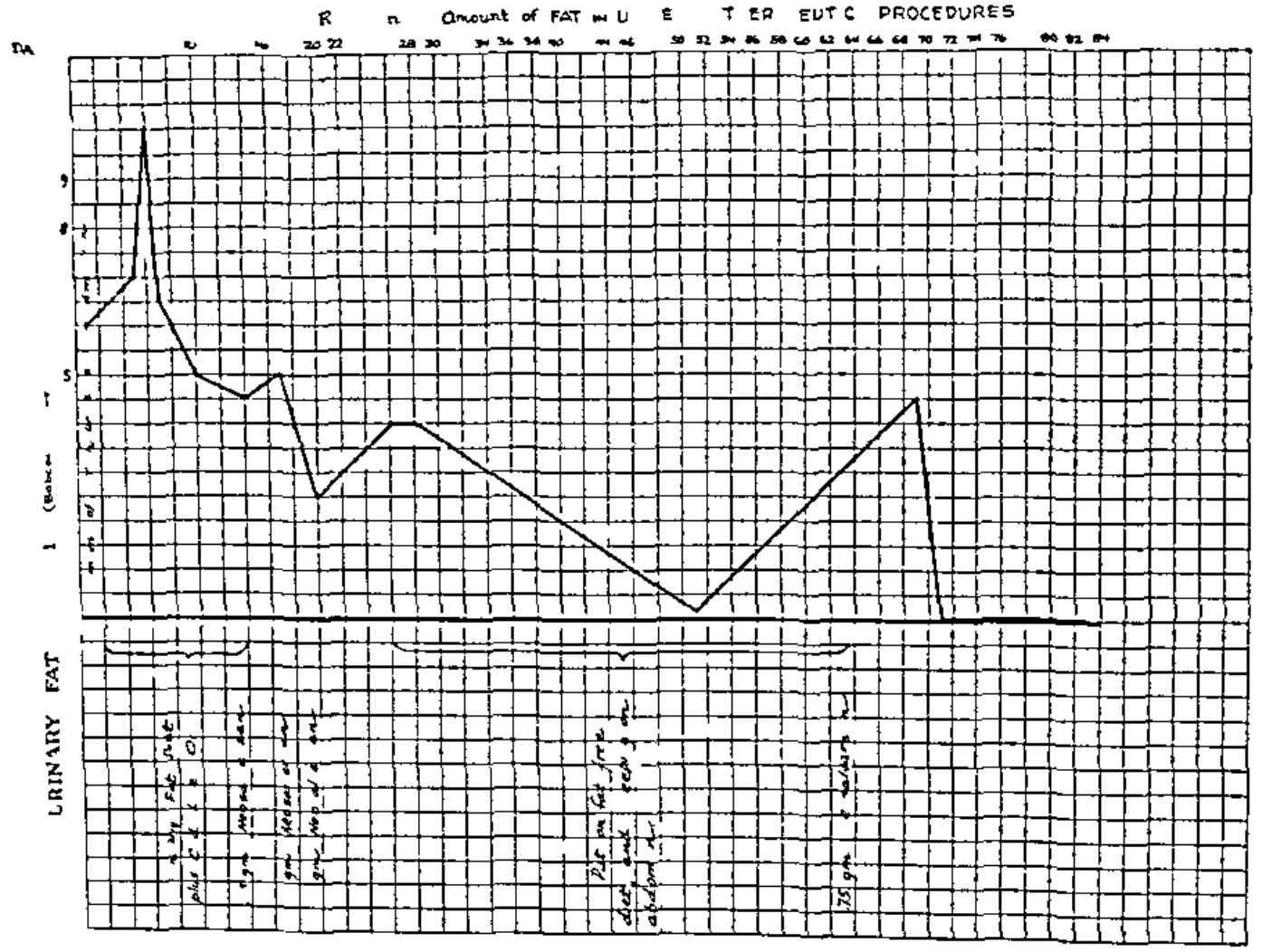


Fig. 4. Chart showing urinary fat output in chylous case treated with neosalvarsan.

the fat output of the urine. We also applied these to our case with the following results.

The effect of posture. Hampton (11) in his very complete case report found that posture influenced but did not control his patient's hæmatochyluria. Its effect in our case was about nil. In striking contrast to this are the cases of Hnatek (10) and Charteris (6). The former's patient with a bilateral chyluria put out twice as much fat in bed as at other times and four times as much fat from the left kidney as from the right. In Charteris' case chyluria could be produced at any time by drinking a glass of milk and reclining at an angle of 45 degrees. Irrespective of the diet our patient's morning and evening urine varied little—viz.

	From morning specimen	Last from evening specimen
On ordinary diet	per cent. to 4 per cent.	6 per cent. to 4 per cent.
On fat-free diet	4 per cent.	4 per cent.

The effect of diet. We next put the patient on a diet with a high fat content much more than he was accustomed to taking and in addition he took cod liver oil. There was only an exceedingly slight increase in the output of fat (see Fig. 4). This result agrees with that obtained by Carter (3). A fat free diet caused the fat output to decrease but not to disappear. Under the same conditions the urine of Hampton's patient became fat free.

The effect of salvarsan. The effect of salvarsan and its derivatives on cases of parasitic chyluria is at present a very much disputed point. Cures have been reported by Deschamps (8) and by Chabanier and Lobo Onell (5). In both of Deschamps' cases the filarial parasite disappeared from the urine. The urine which coagulated in the bladder to such a degree as to clog the urethra was made more fluid by the administration of sodium citrate. In the case of Chabanier and Lobo Onell rapid diminution of symptoms was obtained by the use of arsenobenzol. It was argued however that this result may have been due to the presence of gummatous obstruction of the lymph channels somewhere in the urinary tract.

Our patient was given three intravenous injections of neosalvarsan (D. R. L.)—0·45 gram, 0·6 gram and 0·6 gram respectively. On the day of the last injection the fat output (urine) was 0·5 per cent. or

lowe than it had eve been duri g our observation of the case Six day later the patie t remaining on a fat free diet the fat output had ag in increase l to 0 4 per cent Thirty on e days lat r the urine was practically cl ar A small numb r of red blood cell and an inestimable trace of fat were still p esent

Fo ty three d ys later the p ti nt returned with a complete recurrence The urine contained 0 3 per cent fat and numerous red blood cells He was given 0 75 gram of ne salvarsan and 6 days later or 49 days aft r the fi t course of neo al arsan his ur ne sho ed 0 45 per cent fat Tw o days later it as ent rely negat e not en r l blood cells be ng present This was the first time that the ine had become e tirely normal since the patient had first come under our observation The urin was still fat fr e on October 5 and on November 16 the dat f h s last visit The eosinophilia how ever la pers ted

Salvarsan or its derivatives may be very effective in cases of parasitic chyluria espe cially when that condition i due to ob struction of the lymph channels by ova or by the para ites themselves Thi is still an open question however In those cases in which the obstruction is either non parasitic or i due to secondary changes following parasitic infections such a fibrosi stricture and calculi formation it is hard to understand how salvar an could have any effect

Our own interest in this case and its unex pected pro ress has led u to collate from the literature the known facts regarding the di ease

DEFINITION

Chyluria denotes the presence of chyle or lymphatic contents in the urine the fats appearing as milk like emul ions or mixtures of fatty acid neutral fats and soaps Chylu ria associated with an extremely small urinary fat output has been referred to as lymphuria (15) In lipuria the fat is present as such in the urine and appears in little globules

ETIOLOGY

The three principal types of chyluria with their respective cau es or associated conditions are grouped as follows

I ra t byl	F l ria	h mi
	Ech ococc	
2	Cy t	ll f æ
4	As an l mbri des	
5	A so t d w th mal	
2 N n par t c chylu	Th d t b truct Trauma	
3	T l ul is	
4	Inf ct n (l cahzed bsc s)	
5	P e f n ghbo i g t m s up n th t d ct	
6	A ur ms (exta a) of the l m ph tics	
3 F ct al hyl	1 S mpl chyluria (S es a l Kah 6)	
	2 Chyl ria soc ted ith dia bete (M 2)	
	3 Chyl n soc ted th p g cy (V 1 8 D s 7)	

Parasitic chyluria Adami and Nicholls (1) in their *Principles of Pathology* list the following parasites as having been found in the kidney or kidney pelvi

I	t f d th k l ev
	E h c
	Cy t c c ll l æ
3	D t ma hæmat b m (sch t m)
4	Fu t gyl g gas
5	F l a sa g h mu
6	P tast m m d ti l tum
I ra tes f u d th pel i f k d y	
	I il ia gu h mu
	D t ma hæmat b m
3	Fust gyl g g
4	A a l mbric l

The literature however contains prac tically no report of parasitic chyluria other than tho e due to the filaria sanguinis hom inis Quarelli (23) announces the ob erva tion of intermittent chyluria during the febrile paroxysms in a case of estivo autumnal mala ria when the phenomenon would last for 10 to 1 hours Quarelli s belief that it suggested latent malaria i supported by the fact that quinine therapy caused the di appearance of the chyluria

Pemlinger (4) reports the cases of a man and of a woman who eliminated in the urine the membranes and vesicle from an echino coccus cyst above the bladder No operation was attempted in either case and the general condition had been fair to the date of hi report In both ca es the chyluria was thought to be due to compre ion It had exi ted long before there was anything to suggest the pre ence of echinococcus di ease

Carter s (3) case which cleared up under salvarsan had a positive Wassermann and strongyloides stercoralis embryos were found in the stools

A parasite such as the filaria sanguinis hominis for example may cause lymphatic rupture in a number of ways The larvæ may block the lymphatics or the thoracic duct itself secondary inflammatory changes due to the presence of parasites may cause obstruction by stricture or calculi (Mackenzie case 17) or the larvæ may create false passages as a result of their burrowing

Non parasitic chyluria That any process which produces lymphatic obstruction may cause chyluria is obvious In these cases an important point to be kept in mind has been stated by Warthin (29) who says that chyluria takes place in the presence of thoracic duct obstruction *only when the collateral lymphatic circulation is inadequate* The adequacy of the latter is suggested by the frequent occurrence of potentially obstructive tuberculous lesions of the thoracic duct as compared with the rare occurrence of chyluria

Functional chyluria Since the exact point of communication between the lymphatic and urinary systems has never been definitely determined in any case of chyluria it would seem doubtful if such a condition as functional chyluria really exists Sanes and Kahn (26) however report a bilateral case in which every attempt to determine the etiology including exploratory operation was negative These observers thought that their case was due to the direct passage into the urine of fat from the blood through the kidney epithelium probably as the result of a functional disturbance of the kidney cell

PATHOLOGY

Contributions to the pathology of chyluria are very limited The articles of MacKenzie (17) Havelburg (12) Low (15) and Manson (19 20) present most of the pathological data to be found in the literature However although the exact pathological condition in any case has never been demonstrated because of the difficulty in tracing the lymphatic system a number of interesting associated conditions have been observed In the case reported by Hertz (13) although the obstruction of the lymphatic duct was above the diaphragm only one kidney showed chyluria

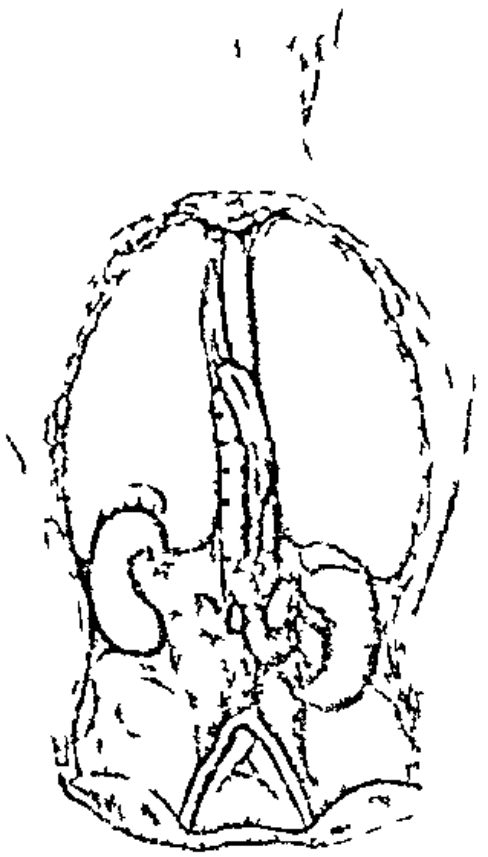


Fig 5 Illustration by Dr Stephen Mackenzie case of filaria haematochyluria showing semidiagrammatic drawing of dissection of the abdominal and thoracic lymphatics see from behind Made by Mr F H Fenwick The lymphatics are accurately represented as displayed in the dissection having been plotted to scale from the actual Thoracic duct receptaculum chyli trunks and lumbar diagrammatic The left kidney displaced upwards to expose the lesser lymphatics Gallstained illustrating lumbar lateral lymphatics b Thoracic duct passing through inflammatory material Calculi left renal lymphatics (From Transactions of the Pathological Society of London)

Mackenzie's case which I quote below gives the most complete pathological description which has appeared to date This case which occurred in a soldier who had seen service in India was proved to be filarial in origin The chyluria which was marked was associated with left renal colics Bronchopneumonia caused death after a gradual downhill course The chyluria was presumed to originate in the left kidney (Fig 5) Mackenzie's descriptions of the necropsy findings are as follows

The thoracic duct commences in a dense mass of lymphatic tissue and glands which extend from the bifurcation of the aorta below to the level of the aortic opening of the diaphragm above Looked at from behind this mass occupies the whole of the space between the kidneys and is continuous below with the chains of lymphatic tissue on the iliac arteries This mass consists very largely of enormously dilated lymph sinuses which can hardly be inflated The receptaculum chyli commences by two large lymph sinuses about the size of a pencil one from each side of the aorta and is joined opposite the aortic opening of the diaphragm by a third large sinus about the same size The duct now ascends sinuous and much pouched for 3 or 4 inches varying in diameter from ¼ to inch pervious for the first inch and a half above the aortic opening of the diaphragm then filled with a loose clot for an inch and a half after which it is lost in a tough thick mass (query inflammatory) (The occluded point in the thoracic duct when opened was found to contain a very long twisted clot tapering to the end It is left *in situ* to be shown before being submitted to microscopic examination) About 4 inches above this point when it can again be traced although still involved in dense tissue it is now the size of a small crow-quill impervious and tending to the left side behind the aorta At its termination in the angle between the left subclavian and internal jugular veins it passes through a mass of lymphatic tissue is pervious and about the size of a goose quill A state of the iliac the lumbar and renal lymphatics are very much enlarged the enlargement is especially marked in the left iliac and left renal lymphatics Scattered throughout the left renal lymphatics are numerous hard round masses some the size of a pea but mostly smaller These masses manifestly occupy the lymph sinuses

SYMPTOMS

The appearance or character of the urine may be the only symptom The condition is peculiarly intermittent especially when the associated disease is of the parasitic type The milky urine may suddenly follow the partaking of a meal rich in fats it may develop after a strain or it may appear without any demonstrable cause Osler has observed its appearance during childbirth with subsequent cessation after delivery

Weakness loss in weight and anæmia may precede accompany or follow the development of chyluria Lymph scrotum elephantiasis chylothorax chylopericardium or chylous ascites may be associated conditions Renal colic may occur due to the passage from the kidney of coagulated masses of chylous urine

DIAGNOSIS

The presence of chyluria is usually easy to determine The urine is acid low in specific gravity and looks not unlike milk It may have a pinkish tinge due to the presence of red blood cell Unlike frank lipuria in chyluria as a rule fat droplets cannot be seen under the microscope but etherization will separate the fat from the emulsion and the exact amount can be determined by the Babcock test The protein content of the urine is increased A careful study both of the urine and of the clinical history is necessary to determine the type of chyluria in a given case This study must include a careful past history of the patient as to residence and infections and a careful examination of the blood for parasites of the urine for parasites and hooklets and of the stools for parasites and ova These examinations must be made daily for at least a week

The exact point of communication between the urinary and the lymphatic system usually cannot be determined without operation

PROGNOSIS

In cases of non parasitic chyluria the prognosis of course depend upon the nature of the obstructing agent If the obstruction is non malignant and can be both demonstrated and reached by operation the outlook is good Recanalization of a thrombus of the thoracic duct may be successful The postural type may be readily relieved

It is conceded by various authorities that obstruction due to filaria is rarely cured The patient however may live for years and die from some intercurrent disease unless the loss of chyle is too great a drain upon his system

As to functional chyluria as reported by Sanes and Kahn no conclusion has been reached concerning the prognosis

TREATMENT

The treatment of chyluria like the prognosis depends on the cause of the condition Until the cause has been determined the treatment must be symptomatic including a low or fat free diet close investigation as to the effect of posture especially during sleep and sodium citrate by mouth if the patient is

troubled with renal colic or with difficulty in urination due to clotting of the chylous urine Any co existent urinary infection should be treated persistently

It should be remembered that chyluria is only a symptom and that therefore if it is non parasitic and its cause is known the treat ment should be directed to that cause

The treatment of parasitic chyluria should be that appropriate for the particular parasite present in the individual case

If all efforts to locate the cause have failed as in the authors case treatment with sal varsan or neosalvarsan should be tried If that fails the final resource if the patient is failing to any great extent because of the drain on his system is an exploratory operation In *unilateral renal cases if the findings* are negative on exploration decapsulation should be done with the division of all tissue around the renal pelvis except the blood vessels and nerves If the kidney producing the chyluria has a poor function or if decapsulation has failed a nephrectomy should be done pro vided of course the other kidney is normal

CASES REPORTED IN THE LITERATURE

Chyluria of the parasitic as of the non parasitic type is rare although it was known by the ancients as Hippocartes (14) and Galen both speak of it For a very complete his torical review the reader is referred to the article of Sanes and Kahn (26) The only reports of real clinical value however are those which have appeared ince the discovery of the filaria sanguinis hominis and the advent of the cystoscope

In 1862 Carter (4) presented two interesting ca es apparently filarial in origin One was in an adult Hindu with lymph scrotum and chyluria the other occurred in association with a mass in the groin and a discharging lymph sinus These conditions have since been frequently observed and are explained as mechanical obstructions with subsequent lymphatic rupture secondary to some other cause such as filariasis or tuberculosis

In 1862 Waters (30) also presented a case apparently filarial in origin He thought that the chyluria was due to a reflex condition of the capillaries of the kidneys as a con equence of which the albumin the fibrin the fat and the blood corpuscles are filtered from the blood vessels and make their appearance in the urine

In 1882 MacKenzie made the first complete report of a case of chyluria which was proven to be due to filariæ the parasites being found both in the blood and the urine This was before the time of the cystoscope but the autopsy which was very unusual and is described above caused MacKenzie to believe that the condition was left renal in origin

The only operative findings ever recorded in cases of this type so far as we have been able to discover are given in the case of Stuertz (7) and that of Sanes and Kahn Stuertz did a left nephrectomy finding in the kidney *which had been removed* the Eus trongylus which he thought had caused the chyluria The patient however continued to have chyle in the urine after the operation

Sanes and Kahn in their case which was bilateral found nothing abnormal in the kidneys themselves or in the surrounding viscera and concluded that it was non para sitic and renal in origin

In 1908 Luedke (16) reported a case of non parasitic chyluria in which the urine left the ureters clear but became milky in the bladder He claimed that the condition was due to a colon bacillus inflammation of the bladder Magnus Levy s (18) case was right renal in origin and was associated with diabetes

In 1911 reporting one of the few autopsies on this condition Low described his case as a lymphuria feeling that this was the proper term to apply to a chyluria in which the amount of fat present in the urine was almost nil As dilated lymphatics were found in both the kidneys and the bladder Low thought that both had contributed to the leakage

Hampton concluded that the chyluria in his case of non parasitic hæmatochyluria was caused by a leakage in the right kidney Hampton likens the deep lymphatics of the kidneys to the cerebral arteries as the points of lowest resistance in their respective sys tems and assumes that lymphatic obstruction results in a leakage causing chyluria just as hypertension often results in a leakage which causes apoplexy

Other cases of no less interest have been reported from time to time by Havelburg (12) Hertz (13) Salkowski (25) Brandenburg ( ) Pope (22) and Furness and Stebbing (9)

SUMMARY OF AUTHORS CASE

1 This was a case of chyluria left renal in origin

Searches for parasites were negative in spite of the fact that the patient was Chinese and had an eosinophilia of 5 to 7 per cent

3 Posture had no effect on the condition

4 Diet caused little change Increasing the fat intake did not increase the fat output A fat free diet lowered the fat output a little

5 The differential phenolsulphonephthalein test showed a normal left kidney (chyluria side)

6 The pyelogram was not pathological

7 Neosalvarsan was directly followed in a few days by complete disappearance of fat as well as red blood cells from the urine

8 On the date of his last visit the patient had remained fat free and showed no hæmaturia for one and two-thirds months although the eosinophilia had persisted

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HÆMATURIA—ITS SIGNIFICANCE[1]

A Brief Clinical Study of 821 Consecutive Cases

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THE presence of macroscopical blood in the urine can be due to a great variety of causes and generally signifies some serious pathological condition of the urinary tract It is not a clinical entity which requires treatment but a symptom which demands investigation

The importance of hæmaturia and the necessity of determining its cause must be recognized by every physician and should be carefully impressed on each patient suffering from urinary hæmorrhage Notwithstanding all that has been said and written on this subject there is still a tendency for the medical profession to regard this condition lightly to treat it without diagnosis and to consider a cessation of bleeding as an indication of cure This is largely due to the fact that hæmaturia is usually intermittent in character During the free interval while the patient is apparently in perfect health it is not surprising that both patient and physician should minimize the importance of this danger signal It is at this time while there is yet a probability of cure that the best opportunity for investigation and diagnosis is afforded

Hæmaturia always means some serious general disease or a lesion somewhere in the urinary tract This has already been emphasized by Kretschmer with 38 cases and by many others Before a final decision as to the source and cause of the bleeding is made a careful history should be taken and a complete physical examination made The ingestion of certain drugs such as urotropin turpentine phenol etc may be the primary cause of the bleeding Acute and chronic febrile diseases such as scarlet fever measles malaria etc may produce hæmaturia Scurvy pernicious anæmia purpura syphilis and parasitic diseases may be accompanied by blood in the urine But even with this list we must admit that a great many hæmaturias are due to some surgical lesion of the genito-urinary tract To impress this fact on all of us more directly I have taken up the study of 3 800 consecutive admissions to our Department at the Royal Victoria Hospital Of these cases 821 came in complaining of hæmaturia this number does not include cases where microscopical blood was found at examination but only those in which the patient complained at some time or other of having passed blood in the urine The list given below gives in tabulated form the number of cases suffering from the definite condition specified which showed blood in the urine but it must be observed that all patients suffering from such conditions do not give evidence of blood The number evidencing blood in each condition herein set down is relatively small This is especially true of injuries of the kidney renal tuberculosis infections of the renal pelves ureteral stones bladder stones growths etc The following is a classification of the 821 hæmaturias in 3 800 admissions to the Department of Urology

CLASSIFICATION OF 821 CASES OF HÆMATURIA

		Number of cases
Kidney		
	Trauma	1
	Acute nephritis	7
3	Chronic nephritis	6
4	Tuberculosis	88
	Pyelitis	
	Pyelonephritis	32
6	Foreign body (calculus)	64
7	New growth (malignant)	
8	Congenital	
	Horseshoe kidney	3
	Double pelves (infected)	5
9	Cysts	
Ureter		3
	Foreign body (calculus)	8
	Inflammation (traumatic)	
3	Congenital	
	Double ureter with calculus and infection	
Bladder		
	Trauma	6
2	Acute and chronic inflammation	38
3	Diverticula	4
4	Foreign body (calculus)	39
	New growth	
	Malignant and benign	8

Read before the Maine and New Brunswick Medical Societies Boulton Maine June 6 3

Ureter	
Acute inflammation	10
2 Chronic inflammation with bed	39
3 Foreign body	2
4 Prostatism	54
5 New growth malignant	14
Urethra	
Trauma	13
2 Acute inflammation	
3 Chronic inflammation	15
4 Stricture of urethra	
Foreign body	1
6 New growth benign (caruncle)	
Unclassified as to etiology	34

An analysis of these 821 cases shows that 192 were due to calculi 113 to tumors 88 to renal tuberculosis and 143 to surgical infections of the ureters and kidneys or excluding the urethra 536 cases out of 761 that is over 70 per cent were caused by calculi tuberculosis cancer or surgical lesions of the kidney while the other 30 per cent most certainly required investigation The great importance of subjecting these patients to a careful and thorough examination is at once apparent With the present day methods of diagnosis the origin and cause of urinary hæmorrhage can be ascertained in a very large percentage of cases Indeed the regular routine urological examination will shed much light on all such cases The findings given in the preceding table cannot fail to impress us with the fact that red blood cells *have no place in normal urine and that they* are caused by some pathological condition which it is our duty to discover

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CONGENITAL DIVERTICULUM OF THE COMMON BILE DUCT

By HENRY W S WRIGHT MS (Lond) FRCS (Eng) Tsinanfu North China
Surgeon Shantung Christian University Hospital

THIS condition sometimes erroneously called congenital cyst of the common bile duct is one of considerable rarity Although its symptomatology is characteristic and its treatment is by now standardized most of the cases have been unsuccessfully treated because the surgeon was unaware of the existence of the condition with which he was unexpectedly confronted It is well therefore that the cases should be recorded as they occur in order that the disease may be borne in mind and perhaps some light thrown on its origin

The case to be described is somewhat unusual in two respects first in that there was present a definite narrowing of the intrapancreatic portion of the common bile duct and second in that the patient was of the male sex

The patient Chi Tung Sheng a Chinese boy aged 5 was admitted to hospital on July 28 1923 His family history contained nothing of importance He was married but had no children In childhood he had had measles and smallpox He stated that he frequently passed round worms in his stools

Since he was a small child he had noticed that his skin was slightly more yellow *than is usual in* his race Five months ago his eyes became yellow and at the same time the whole of his body was similarly affected His skin itched and small raised red spots appeared on his legs After the jaundice became more marked he noticed a lump in the right side of his abdomen During the last month the jaundice has markedly increased and his stools have been grey in color More recently still the stools have been loose and frequent Once or twice they have been black He complains of a little occasional abdominal pain which bears no relation to food As far as could be ascertained it was neither acute nor colicky and did not appear to disturb him much

His appearance was that of a well made boy of fifteen he was little thin seemed weak and rather lifeless Beneath the first second and third finger nails of each hand were hæmorrhages most marked on the first finger less so on the second finger and quite small on the third The outline of these hæmorrhagic areas was quite symmetrical on both sides The only other physical signs of disease were those of a tumor in the right upper abdominal quadrant The abdominal wall was bulged forward by a round mass about the size of a fetal head It was tense and elastic to palpation dull on percussion and moved slightly with respiration Its respiratory excursion was not so great as that of

a distended gall bladder Examined bimanually slight fluctuation could be obtained The upper border of the tumor was beneath the liver its lower border reached down as far as the umbilicus mesially it just crossed the middle line It did not bulge into the flank but could be palpated therefrom No band of resonance corresponding to the colon could be detected crossing it transversely The liver was not palpable

While in hospital the patient s temperature was between 99 and 100 his pulse was 80 full and strong His urine contained bile His blood contained 4 030 000 red cells and 7 120 white cells per cubic millimeter Hemoglobin 50 per cent The coagulation time was 12 minutes and the Wassermann reaction negative

His stool were grey contained no ova no amœbæ and no excess of fat Several diagnoses were suggested Among these was the correct one which was rejected because of lack of familiarity with its symptomatology A blockage of the cystic and common ducts by round worms was thought to be a possibility since they are so extremely common in this country and were present in this patient It was however obvious that laparotomy was imperative This was done after 3 days preparation consisting of a daily intravenous injection of 5 cubic centimeters of a 10 per cent solution of calcium chloride He was fed on forced fluid up to 4 000 cubic centimeters daily and was given as much glucose solution per rectum as he could absorb It was noticed at operation that his coagulation time was considerably reduced

The patient was given an injection of 1/100 grain hyoscine and 1/6 grain morphine 1 hour before operation A smaller dose of the same combination of drugs was given again after half an hour

The abdominal wall was infiltrated with 1 per cent novocain and a right external rectus incision was made through the skin and anterior rectus sheath The muscle was displaced mesially and the posterior sheath and peritoneum infiltrated widely with novocaine

When the abdominal cavity was opened a small quantity of free fluid escaped and was mopped up A rapid examination revealed the following condition of affairs

The right hypochondrium was filled up by a tense round cyst about the size of a fetal head From over its upper edge protruded the gall bladder which was apparently normal in all respects The liver was a little congested but to the naked eye showed no signs of cirrhosis On its anterior and inner aspect the cyst was crossed transversely by the pyloric portion of the stomach and the first part of the duodenum The descending portion ran downward and slightly inward When the lower part of the incision was retracted the hepatic flexure of the colon could be seen on the lower and mesial aspect of the cyst Above the pylorus the foramen of Winslow was stretched tightly over the cyst and into it a finger could be inserted with difficulty Laterally

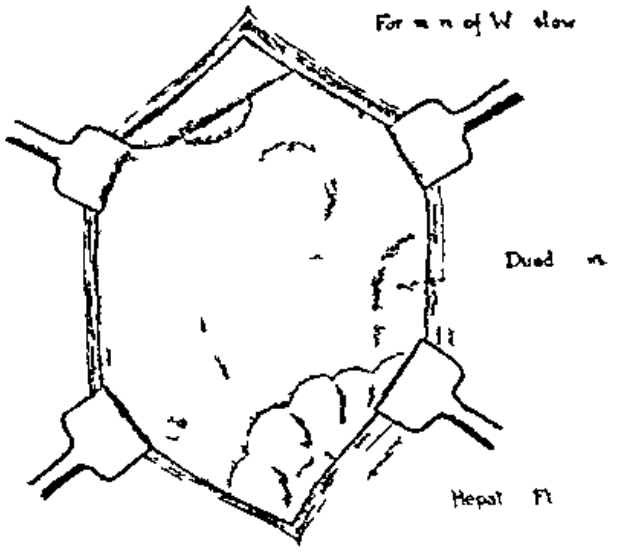


Fig. 1.—Cyst of common bile duct in patient

the cyst wall was covered by peritoneum which was reflected off the lateral aspect of the duodenum and stomach The condition is illustrated in Figure 1 A short incision was made in the peritoneum parallel to the duodenum

The peritoneum was easily stripped from the lateral wall of the cyst and below it the kidney could be felt It was not possible to dissect the duodenum from the anterior aspect nor was any serious attempt made as the diagnosis was by this time clear

During the stripping of the peritoneum and exploration of the relation of the cyst there was a good deal of trouble with oozing It should be noted here for future guidance that such a procedure was a mistake and should not be done under any circumstances Isolation of the cyst and its removal after tying some kind of pedicle although it has been done necessarily results in the death of the patient The oozing caused by attempts at enucleation may be a material factor in prognosis for a jaundiced patient

Packs were now inserted into the abdomen and the cyst tapped The fluid withdrawn was chocolate colored and contained altered blood bile pigment cholesterin and a few pus cells The opening was then enlarged the cyst wiped out and the interior inspected No openings of any kind could be seen The head of the pancreas could be felt through the cyst wall by using one finger inside and another to press down from the outside Nothing could be felt in the intrapancreatic part of the common bile duct The opening was sewed up partly and partly used to make an anastomosis between the cyst and the duodenum adjacent to it This was easily done by using clamps and a double layer of fine catgut The suture line was reinforced by a few separate interrupted sutures The opening in the peritoneum was

sewn up and the abdomen closed in the usual way A small drain was left down to the anastomosis This was removed next day

The whole operation lasted 1 hour and 10 minutes A large part of the time was consumed in tying off many tiny bleeding points both in the abdominal wall and the retroperitoneal space which had been opened up while exploring the relations of the cyst

The boy stood the operation very well his pulse at the finish being 9 Up to the time he died it was never above 105 beats to the minute

On the morning of the third day after operation the patient suddenly collapsed and died A complete postmortem could not be obtained but the operation wound was opened up and the cyst was removed together with the liver pancreas bile ducts and duodenum There was no peritonitis and no bile in the peritoneal cavity The anastomosis was firm On opening the peritoneum over the cyst the retroperitoneal space was found all blood stained and a clot about the size of an orange was present The condition then was that commonly *seen in patients dying after operation for the relief* of long continued biliary obstruction The hemorrhage present was not enough to account for the patients death which was probably due to cholæmia

The liver was normal in size but rather congested Section showed no cirrhosis but the smaller bile ducts were rather distended The gall bladder was to the naked eye normal it contained about an ounce of a slightly yellow mucoid secretion The cystic duct was not dilated it opened into the cyst wall by a round opening situated in its upper and outer part Its last inch and one half seemed to *run in a groove in the cyst wall from within out* ward After some search the openings of the hepatic and common ducts into the cyst were found situated about 2 inch apart on the posterior cyst wall They were guarded by two semilunar valvular folds the cavities of which faced one another and were formed by pressure of the anterior boundary of the duct as it entered the cyst The cyst was lined by biliary epithelium and its walls were composed of fibrous tissue The hepatic duct was normal but the lower end of the common duct showed an interesting state of affairs The cyst had involved the common duct nearly up to its intrapancreatic portion Some difficulty was experienced in getting a probe long it both from the cyst and from the duodenum When this was accomplished and the duct slit up it was seen to be narrowed just proximal to its joining with the pancreatic duct Its circumference above this constriction was 13 millimeters and that of the constricted portion was 5 millimeters The duodenal opening was apparently normal in size and position The accompanying diagram shows the condition better than any description (Fig 2)

This condition as has been said already is *very uncommon In 1917 Erik Waller (1) col*lected all the cases recorded up to that time There were 35 including his own In 1920 McConnell (2) reported one case since then Kremner (3) Budde (4) Reel and Burrel (5) have reported one each Morley (6) has added two more to the list thus making a grand total of 42 including the one here described At the end of Waller's paper there is a complete bibliography of the condition up to date

Briefly stated the salient etiological and clinical features of the disease are as follows

The average age at which symptoms first appear is 13 years The youngest patient a child of 5 years reported by Oxley (7) had had symptoms from birth In the case here described the patient said that he had always been a little yellow so perhaps the same may be said of it but the Chinese are notoriously bad observers of clinical phenomena The oldest patient on record *that of Reel and* Burrel (8) was a woman age 56 who had noticed the presence of a tumor for 20 years

As far as sex is concerned the disease predominates in the females to the extent of 85 5 per cent and only 6 cases have been recorded as occurring in boys We have as yet no explanation of this peculiarity

There is no evidence that heredity plays any part in the causation of this condition One of Morley's cases gave a family *history of* jaundice The patient had had three sister all of whom had died within the first month from jaundice Unfortunately no postmortem examination was made on any of them

If the existence of the condition is borne in mind the clinical picture should in all cases be sufficiently clear to enable a diagnosis to be made without difficulty The outstanding features are three namely pain tumor and jaundice Wasting may *sometimes be present* but is by no means constant Should a female child present these three symptoms it should *arouse strong suspicion* on the part of the doctor

The pain is usually acute intermittent and colic like in type It may be severe enough to make the patient double up in bed on the other hand it may be dull and aching or it may only amount to mild discomfort *One of the patients had* no pain at all and in the case here recorded there was very little pain But by far the large majority of pa

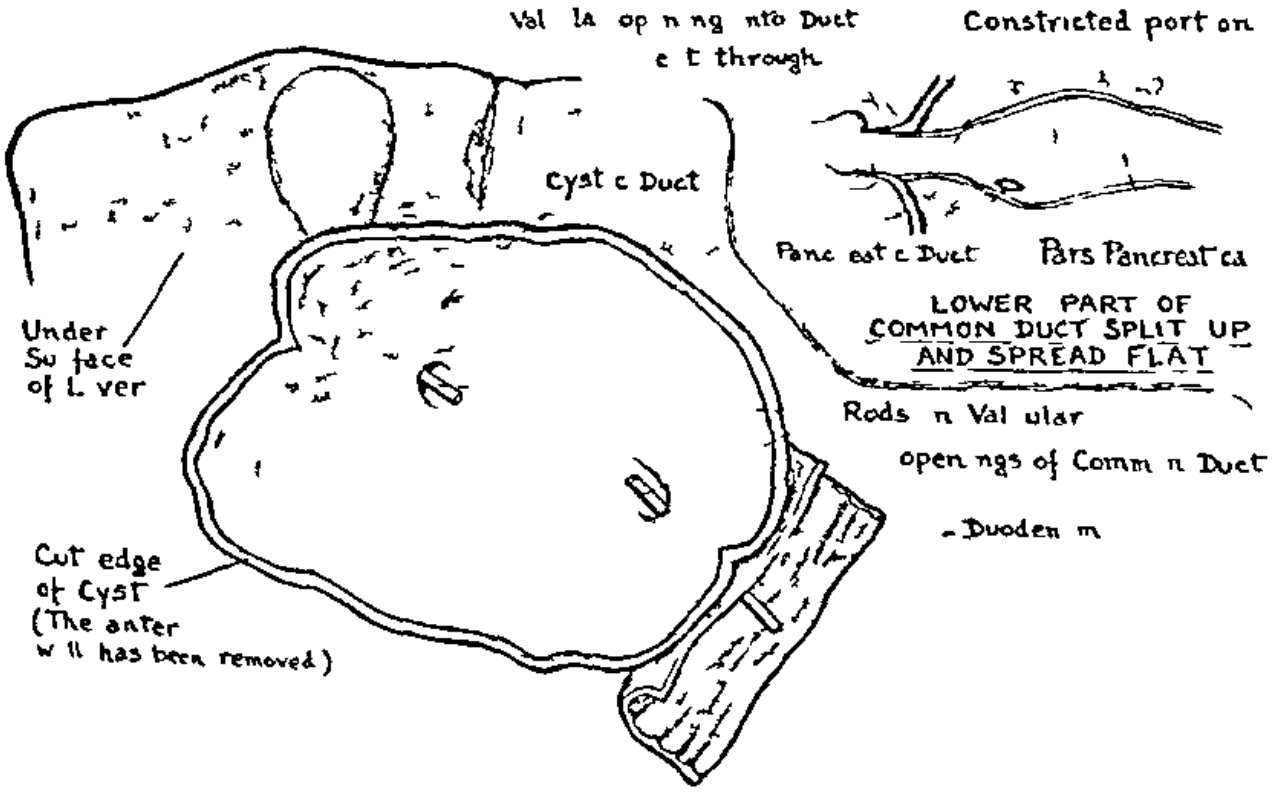


Fig. 1.—Drawing of postmortem specimen.

tients have acute colic like pain which may be the initial symptom antedating the other by many months.

Vomiting is not constantly present. It may accompany very severe pain and in one case appeared to relieve the pain. In the latter case Morley (9) suggested that the vomiting was due to chronic duodenal ileus caused by pressure of the cyst forward on the root of the mesentery and the superior mesenteric vessel.

The tumor varies in size. It may be large enough to be mistaken at first sight for a pregnant uterus or an ovarian cyst. In Waller's case it was about the size of a fist but most commonly it is about the size of an ostrich egg or fetal head. It is rounded, tense and not very tender. On percussion it is dull and the upper limit of its dulness merges into that of the liver. Unless very large it moves slightly on respiration but its respiratory excursion is not so great as that of a distended gall bladder. It was noticed once that after the ingestion of food the cyst underwent painful contraction and increased in size.

The degree of jaundice also is variable. It may be intermittent and scarcely ever noticed by the patient or it may be complete and remain so for some time. However the amount of jaundice does not vary with the size of the cyst. In one case in which the cyst was taken for an ovarian cyst the patient had only slight jaundice. Slight jaundice may date back many years.

Of these three characteristic symptoms either one may usher in the disease or may be that from which the patient demands relief. The patients therefore tend to fall into one of three groups.

(1) They may be referred to a gynecologist for the removal of a large abdominal tumor. (2) they may be seen in the medical out patient department complaining of pain and jaundice or (3) they may come to the surgeon with an acute abdominal condition accompanied by great pain tenderness fever and vomiting.

If one is aware of the condition the diagnosis is not difficult. A tumor in the right hypochondrium is very uncommon in children

It should not be difficult to differentiate the condition from an enlarged gall bladder by its shape and comparative fixity and from a pancreatic or liver cyst by its position When the cyst is very large and there is no jaundice the difficulties must be great A careful inquiry into the history for slight jaundice and for information as to where the tumor originally arose may throw light on the case

As has been said treatment in the majority of the recorded cases has not been very successful On three occasions the cyst has been removed resulting of course in the death of the patient Five patients died after operation from violent hemorrhage coming either from the cyst wall or as in one case from the stitches Of 2 cases in which drainage was employed only three survived One of these had a permanent fistula and died later of pulmonary tuberculosis The remaining two were alive and well at the time of publication One patient had three operations The first consisted of simple drainage The second time the cyst was again drained as an abscess had formed within it and at a third operation designed to drain the cyst permanently by making an anastomosis between it and the duodenum it was found that as the result of the inflammation the cyst had so shrunk that any such procedure was impossible The third patient was alive and well one year after operation but had a small constantly discharging fistula In this group of cases there were many unsuccessful secondary operations

Primary drainage followed by anastomosis or laparotomy with this object in view was done in eight cases Of these patients five recovered and three died It may be inferred from a perusal of the reports of these cases that a secondary anastomosis following drainage may be an extremely difficult if not impossible procedure

A primary anastomosis between the cyst and the duodenum is obviously the operation of choice although in severely jaundiced patients primary drainage may be a wise preliminary step Two have recovered and two died of the four patients in whom this has been done In one of the fatal cases the cyst was drained externally at the same time in the other which is here reported it is probable that the patient's condition had more to do with his death than the choice of operation

The etiology of the disease is still very obscure From a consideration of the morbid anatomy it is quite plain that once a diverticulum is present nothing will prevent the further development of the condition The hepatic and common bile ducts are situated within a short distance of each other at the bottom of the diverticulum As this fills up with bile and enlarges it will tend to press downward on and at the same time overlap the ducts as they enter and leave the cyst making the opening valvular in form so that the larger the cyst the greater the obstacle to outflow on the part of its contents

When as occurred in this specimen the disease has progressed far enough to render the duct openings flattened crescentic and valvular it is difficult to see how the cyst ever emptied itself at all Postmortem it took a detailed search before the openings were found so inconspicuous were they

Having explained the growth of the diverticulum and in part the origin of the symptom we will consider how it originally arose The first and most obvious explanation of a dilated duct is obstruction below the dilatation Now although obstruction to the common duct does sometimes produce considerable dilatation it is not of the type seen here or described in other records of the condition but is cylindrical or spindle shaped Here we are not dealing with a generalized dilatation of the bile tract but with a local diverticulum of varying size involving fairly constantly one particular part of the tract viz the hepatic and supraduodenal portions of the duct the cystic duct opening into the wall of the diverticulum Moreover in nearly all the postmortem record obstruction has been conspicuously absent In some cases it has been noticed that the entrance of the common duct into the duodenum was abnormally placed and in this case there was narrowing of the intrapancreatic portions of the duct This narrowing was not sufficient to prevent the outflow of bile but might conceivably have assisted in raising the intraductal ten

sion and have thus been a contributory factor in the development of the diverticulum The same may possibly hold good with regard to abnormal insertions into the duodenum so that in our search for a first cause we must go further back still In 1910 Heiliger (10) found at autopsy a small cyst of the common bile duct in an almost mature fetus It had caused no obstruction and bile was present in the intestine This gives us some proof that the condition may be congenital and a study of the development of the biliary tract provides us with still more evidence

Stimulated by increasingly frequent surgical exploration of the gall bladder and its ducts recent research has amply demonstrated that the development of the biliary apparatus is not the standardized fixed procedure we formerly supposed it to be Abnormal development is as the result of unfortunate experience better known to surgeons than to anatomists and usually consists in variations in the junction of the cystic and hepatic duct and their relationship to the surrounding blood vessels Such variations are embarrassingly common Most of the observations have been made post mortem or in the dissecting room but a study of the embryology of this region amply confirms these findings

In a 22 8 millimeter embryo from the Harvard Collection (Series 871) the common bile duct is double and the two cavities unite to form a single lumen proximally and distally Lewis in his article in Keibel and Mall's *Human Embryology* (11) states that rudimentary and additional ducts are common in human embryos They may join the cystic hepatic or common ducts but usually occur near the junction of all three In Thyng's (12) model of a 7 5 millimeter embryo there is a small bud representing an adventitious duct just at the junction of the hepatic and cystic ducts It does not reach the liver Similar outgrowths have been described in 9 4 and 10-millimeter embryos (13) and detached nodules of epithelium have been found in two other embryos 14 5 and 16 millimeters respectively (14) Although these developmental anomalies seem to be common in human embryos they are infrequent in the fetal and adult stages As has been said here the common irregularities are in the relationships of the ducts It would seem therefore that the developing biliary system has unusual powers of returning to the normal in spite of early departures therefrom or that its normal development is not completely worked out

Aberrant ducts diverticula and detached nodules of epithelium can be absorbed but it is possible that if there is any small obstruction to the outflow of bile or other abnormal developmental stimuli the small outgrowth may be encouraged to persist and enlarge Such an outgrowth as is shown in Thyng's model and elsewhere described would if canalized and enlarged easily account for the formation of the condition under discussion

To sum up we have a condition which is obviously neither inflammatory nor neoplastic in origin but there is evidence enough to allow us to assume that it is due to the persistence in adult life of some developmental abnormality The occasion of this persistence may in some cases be the raised tension in the bile ducts

I mind bt i t Dr F H M sse fo th pp tun ty to perate on nd report th case He ha l o d a n the l grams wh ch a mpany th text

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TUBERCULOUS CYST OF SPLEEN SPLENECTOMY RECOVERY

By CHARLES H FECK MD FACS New York
Surgeon to the Roosevelt Hospital

PRIMARY tuberculosis of the spleen is a condition uncommon enough to warrant recording as cases are observed

At the Roosevelt Hospital we have recently operated upon such a case which presented some unusual features notably the size of the spleen the extent of destruction of splenic tissue with the capsule still intact and the very mild degree of constitutional reaction

In classifying the case as primary tuberculosis of the spleen we mean simply that there was no clinical evidence of other tuberculous lesions which might have assumed the rôle of a primary focus except tuberculous lymph nodes of moderate size and chronic type though we are of course unable to state definitely that no such focus existed

The patient was a native of Antigua B W I colored 26 years of age married laborer He had lived in the United States since 1920 He was admitted to the Roosevelt Hospital on November 15 1922 to the Medical Service Dr Evan Evan attending physician The condition which brought *him to the hospital was not the splenic condition* but a loss of sexual power for which he sought treatment

A gradual enlargement of the abdomen had been noticed for about 4 months He had no real pain but recently began to have discomfort over the left upper abdomen and lumbar region Exacerbations of moderate pain in this region occurred in April *and October 1922 He had some shortness of breath* on exertion of late occasional slight cough and was subject to colds

He was said to have had jaws when 8 years old Neisser infection 5 years ago questionable chancre 6 years ago No history of chronic illness

Physical examination showed good general physique and nourishment The cardiac and pul*monary signs were normal slight enlargement of* cervical axillary epitrochlear and inguinal lymph nodes no perosteal nodes reflexes normal eyes normal

A large mass fills the left upper abdomen It extends 2 centimeters beyond the mid line to the right downward to the level of the iliac crests it has the general position and shape of the spleen its surface is *smooth edges hard and rounded center soft and* fluctuating It moves slightly with respiration is not tender the greatest circumference of the abdomen is 84 5 centimeters

The lower edge is felt 3 inches below the costal margin seems normal and is distinct from the mass There is no evidence of ascites Weight 140 2 pounds blood pressure 103/78 hæmoglobin 65 per cent red blood corpuscles 4 350 000 white blood corpuscles 8 000 polymorphonuclears 85 per cent eosinophiles 2 per cent Wassermann 4 plus

The blood chemistry was normal The urine showed a trace of albumin a few casts at times and was otherwise negative

November 15 1922 the temperature was 97 to 100 8 degrees later it was normal most of the time Pulse and respiration were normal

Antiluetic treatment (not salvarsan) was given There was no diminution in the size of the spleen nor change in symptoms or signs The X ray showed the descending colon pushed away to the right by a mass otherwise the abdominal picture was negative The X ray of the chest was negative

The cervical lymph node *removed for diagnosis* showed chronic tuberculosis He was transferred to the Second Surgical Division on December 7 1922 and splenectomy was performed on December 9 through a longitudinal incision at the inner third of the left rectus The mass proved to be a huge cystic spleen very adherent to surrounding structures The lower pole and body first *were freed and delivered and adhesions were clamped* and ligated as the operation proceeded The upper pole was firmly adherent to the diaphragm and the splenic flexure of the colon the adhesions were separated and divided partly by sharp dissection and with great difficulty During the dissection a large locule of the cyst at the upper pole ruptured and curdy yellowish white material escaped The *mass was finally freed except at its pedicle and a* large gauze pack filled the hugh pace beneath the diaphragm The vessels of the pedicle were comparatively small and were secured without difficulty and the mass removed After careful hæmostasis the wound was closed without drainage There had been no damage to adjacent viscera and comparatively little loss of blood

The time of operation was 1 hour 45 minutes condition poor An infusion of 500 cubic centimeters of salt solution was given on the table followed by transfusion of blood of 448 cubic centimeters on his return to the ward His condition was critical for the first 2 or 3 days after which the convalescence was uneventful The wound healed *per primam* The temperature ranged from normal to 102 to 103 *degrees for 20 days postoperative finally remaining* normal after the twenty fourth day

He was discharged on January 3 1923 25 days after operation

Reading before the Southern Surgical Association December

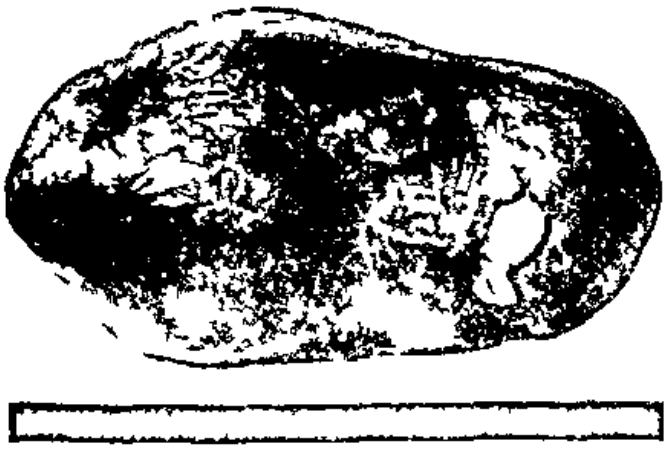


Fig. 1. Tuberculous cyst of spleen. Dimensions 9 by 18.5 by 15 centimeters. Diameter of largest cyst 7 centimeters. Weight 3.7 grams.

GROSS SPECIMEN

The removed spleen was enormous in size. The lower two thirds was occupied by a huge cyst locule filled with a jelly like material, the locule at the upper pole ruptured in removal being much smaller, a very little thinned out plenic tissue remained in the septa between the locules, hardly at the periphery.

Its dimensions were 9 by 18 by 15 centimeters. It weighed 3200 grammes (6 pounds 13 ounces) after the loss of the semifluid content of the upper locule of the cyst.

The largest cyst measured 11 centimeters in diameter.

Only 3 cases of equally large size have been recorded, all being autopsy and not operative cases.

Microscopic Sections. Sections showed no typical tuberculosis nor other characteristic tuberculous lesion. A probable diagnosis of tuberculous aneurism on the gross pathology.

Animal Inoculation. A guinea pig was inoculated with content of cyst on December 12. The autopsy on January 8, 1913 (30 days) showed general miliary tuberculosis.

Winternitz in 1912 reported a collected series of 31 cases of primary tuberculosis of the spleen of which 24 were autopsy findings and only 7 operative. Of the 7 operated upon 3 recovered and died.

Four later operated upon have succeeded fully in January 1911. Griffin in 1919 reported a case of successful plenectomy (weight 08 grams) the patient was reported well 1 year after the operation. He also added a case of successful plenectomy (weight 6.5 grams) for secondary tuberculosis of the spleen with a healed pulmonary lesion at the right apex, well 1 year and 4 months after operation.

Griffin also reports two interesting autopsy cases, one with blood findings simulating pernicious anemia and one with leukemia, in both of which the spleen showed extensive tuberculosis.

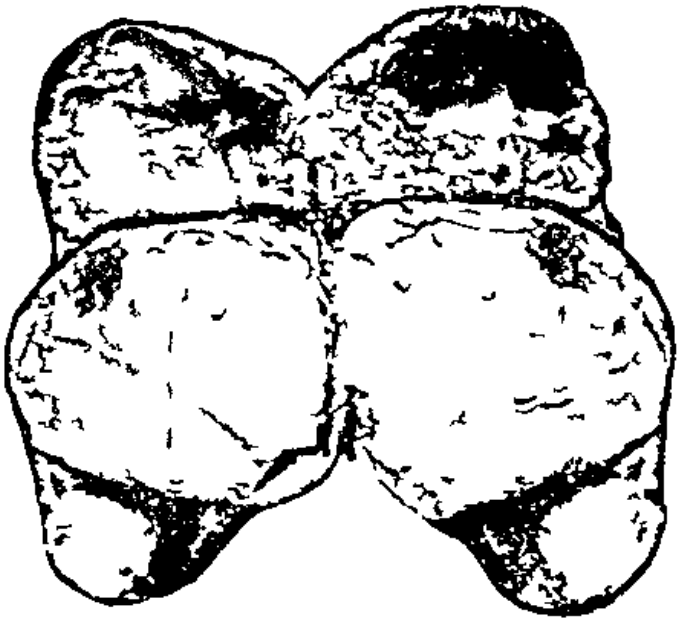


Fig. 2. Spleen bisected, showing cyst.

The careful and thorough review of Winternitz brought out many interesting facts relating to the condition.



Fig. 3. Patient 19 months after operation.

The age by decades of 45 of the 51 cases in the series was

First decade—5 cases	Fifth decade—6 cases
Second decade—3 cases	Sixth decade—2 cases
Third decade—2 cases	Seventh decade—5 cases
Fourth decade—4 cases	Eighth decade—1 case

Examination of the blood was made in 6 cases It was normal in 9 moderate secondary anæmia was present in 11 and there was a definite polycythæmia in 6 the red cell count ranged up to 8 000 000 or more The leucocytes were not generally increased

Other authors have noted the tendency to polycythæmia in tuberculosis of the spleen Douglas reported a marked instance in a man of 39 years of age the red cell count running as high as 8 800 000 Death occurred 9 days after splenectomy

Of the 6 cases of polycythæmia cited by Winternitz 4 were autopsy cases in one the result was not stated and one (6 000 000 red blood cells) *recovered after operation*

Splenectomy in the polycythæmia of Vaquez disease is generally fatal or fails to arrest the disease and is contra indicated (Moynihan) The weight of the spleen in 31 recorded cases was as follows

Case	Grams	Cases	Grams
8	150 to 500	7	500 to 2000
5	500 to 000		000 to 3000
6	000 to 500	3	3000 to 4000

As previously stated the 3 cases of over 3 000 grams were all autopsy cases

Lymph nodes examined in 35 cases showed no clinical enlargement in 29 (82 8 per cent)

The prominent symptoms in most of the cases were splenic tumor and pain in the splenic region

The course was chronic in a majority of the cases rapidly progressive in a few

SUMMARY

Primary tuberculosis of the spleen though rare is a distinct entity and is curable by operation in favorable cases Without splenectomy a fatal termination is inevitable

Splenectomy is indicated in certain cases of secondary tuberculosis of the spleen when the splenic lesion is predominant and the supposed primary lesion is a healed tuberculosis or susceptible of cure

Giffin s case is an example of this condition Polycythæmia occurs in a certain percentage of cases and probably add to the gravity of the prognosis but does not contra indicate operation when the splenic tuberculosis is the *dominant factor in the case The prospect of* a complete cure and restoration to health in patients surviving splenectomy is demonstrated by several of the reported cases

INFECTIONS OF THE HAND[1]

BY JOHN H GARLOCK M D NEW YORK

THE following paper embodies an analysis and a report of the end results of 460 consecutive infections of the hand seen in the private clinic and hospital practice of the writer From the very beginning of this study Kanavel's monograph on hand infections was used as a standard As the number of cases studied increased it became evident that we were gradually laying more and more stress on apparently minor details especially in the methods of diagnosis and the operative and postoperative management of the fascial space and tendon sheath infections We have often been impressed with the fact that close attention to distribution of the swelling and the areas of redness the interpretation of the patient's subjective complaints etc makes for a more accurate and rapid diagnosis The intelligent management of the more severe hand infections presupposes a complete familiarity with the minute anatomy of the hand and forearm and a thorough understanding of the various pathological processes that may exist and their possible paths of extension

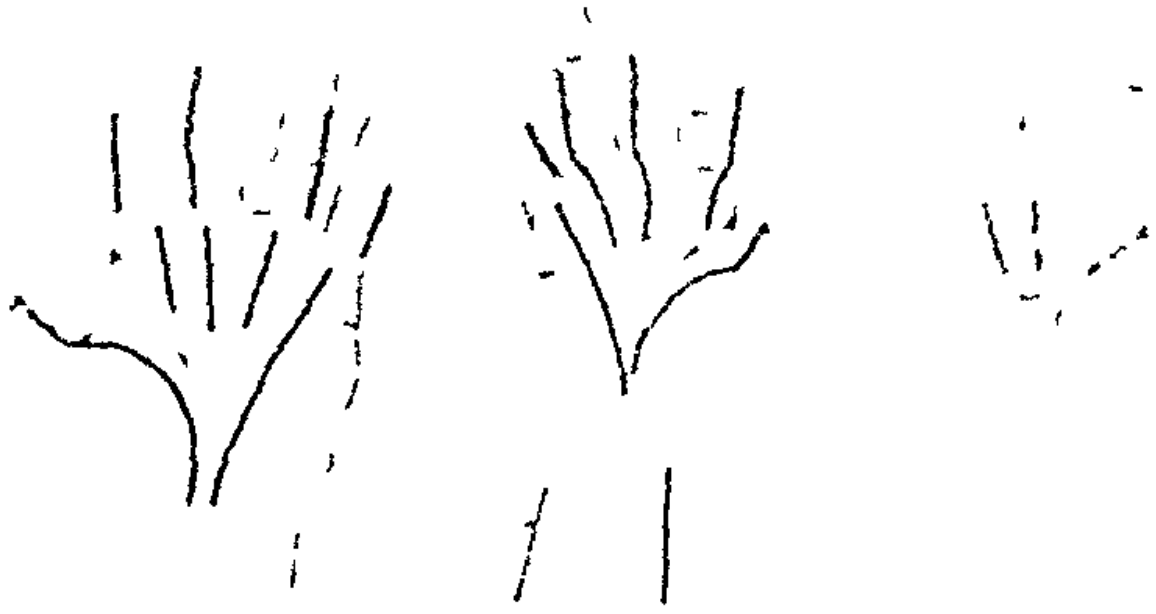
In this group of 460 cases has been included every case of hand infection irrespective of its mild or severe character In a number of instances the cases are discussed two or three times under different headings For instance an infection of the thumb flexor tendon sheath which has extended and involved the radial bursa will be discussed under those separate headings

SIMPLE ABSCESSES AND CELLULITIS

This group comprises 97 cases or 0 4 per cent of the total series It includes simple abscesses occurring in various parts of the hand isolated abscesses in the web spaces i e those not due to a pre existing lumbrical space infection and cellulitis of the digits and hand proper It was noted that abscesses were most commonly seen on the dorsal and ventral aspect of the proximal and middle phalanges and on the dorsum of the hand As a rule these infections are readily recognized However on four or five occasions we have seen deep localized infections over the anterior aspect of the middle or proximal phalanx which on casual examination might have been mistaken for a tenosynovitis In these instances it was demonstrated that the region of tenderness was fairly well localized the swelling and area of redness were confined to the parts adjacent to the point of maximum tenderness and there was considerable active and passive mobility in the finger In cases there was tenderness along the course of the tendon sheath with some pain on hyperextension of the finger but the general appearance of the finger and hand and the presence of some active motion seemed to militate against the diagnosis of tenosynovitis In cision showed collections of pus in the subcutaneous tissues immediately overlying the sheaths The proximity of the infection to the tendon sheath probably was the etiological factor in the aforementioned so called positive signs of tenosynovitis There were 7 cases in this group and they were treated by either simple or crucial incision depending on the extent and virulency of the infection In every instance the primary incision controlled the infection and the end result was devoid of any permanent defect

There were 8 isolated web space abscesses and they were all caused by puncture wounds The physical signs were quite distinctive consisting of marked localized swelling of the entire web area extending on both the dorsal and ventral sides considerable redness limited to the web separation of the contiguous fingers and œdema of the dorsum of the hand confined mainly to the immediate neighborhood of the infection Slight pressure over either side of the web caused pus to exude from the punctured wound Treatment consisted in making an adequate linear incision over the point of maximum tenderness In 3 cases we found it necessary to split the entire web from front to back in order to secure adequate

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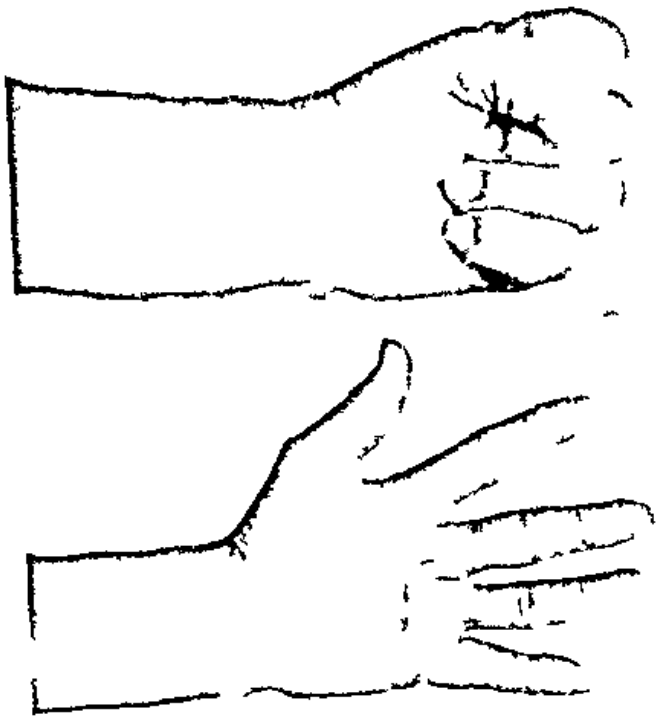


Fig 5 Double bo f ct n d t ab ces the f t f th m ti rpoph l g al j t f th l f middl fi ge Th webs w pl t f m f tt b ck The a c t d lumb l al lso n l d Th es ph t graph tak o the f rth post perat d d d cat th c mp t f ct n t th e ly d t

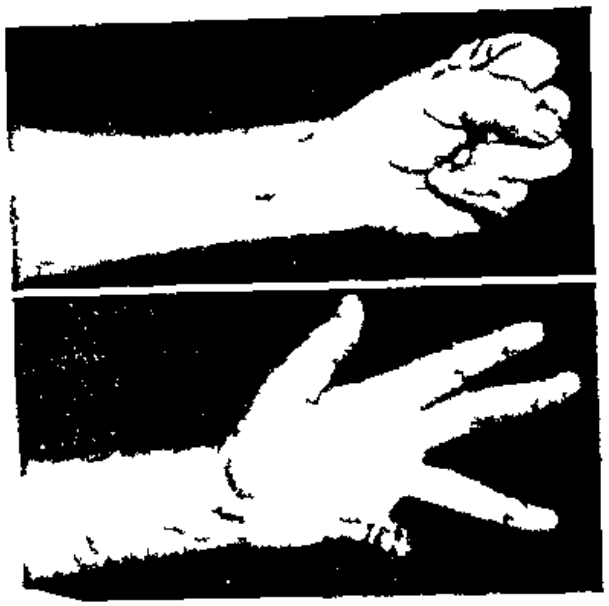


Fig 6 Sh p t e teno t f the l ttle t g P lt ed st phyloc cc hæm t cu P e t w p ted po pl x mat ly 36 h fi r t of symp m Wo l f entry m ll lac r t o the d r m f th m ll e pl ala T l s d l t l ugh l t e t t t l o lea n the h p tal bef e und w he led d ld n t po t f fu th r t tment Ph t graph h the l f rm ty lue t m ke l c nt ct n f th The t h w e l ht ct i e fi Th esult d bte ll be impr l by a p l ti per t

systemic reaction Under conservative treatment consisting of warm boric acid or saline wet dressing these infections subside in a surprisingly short time The following case is illustrative of this group

M W B L was referred for operation with the diagnosis of suppurative tenosynovitis of the flexor tendon sheath of the right ring finger There was no definite history of any injury to the part Two days before he began to experience a dull pain in the right ring finger accompanied by considerable swelling of the entire digit The pain was constant and was characterized as a dull ache Examination showed that the whole finger was of a deep pinkish hue and was uniformly swollen on all aspects No definite point of tenderness was demonstrated although the whole finger was distinctly sensitive to touch The dorsum of the hand was slightly œdematous A faint red line was seen running up as far as the epitrochlear region Temperature was 100 5 degrees F pulse 90 The hand was treated with warm saline wet dressings coupled with eliminations and rest in bed and 48 hours later there was a complete subsidence of the subjective and objective symptoms

In two cases an error in diagnosis was made with resultant incision and exploration Both patients presented what appeared to be an unusual type of cellulitis in the palm of the hand with marked local tenderness As no improvement occurred after 36 hours of conservative treatment it was thought best to incise No pus was found but it was noticed that the palmar fat was unusually œdematous fairly flowing out of the operative wound Following this procedure the inflammatory reaction promptly subsided It is possible if not probable that a continuation of the previous conservative treatment would have caused a complete abatement of all symptoms The result in each case of this series was a return of full function to the part involved

SUBEPITHELIAL ABSCESSES

There were 10 cases of subepithelial abscesses or 4 3 per cent of the total series These infections which consist of a localized collection of seropurulent fluid of a low grade virulency beneath the epithelium were noted most frequently in the region of the distal phalanx and the palm They occurred as a rule in people engaged in manual labor and considerably thickened epithelium was almost a con

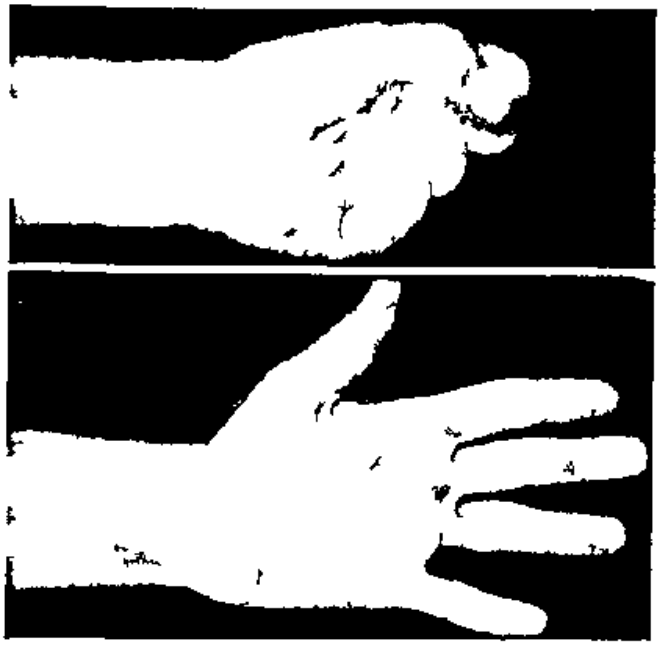
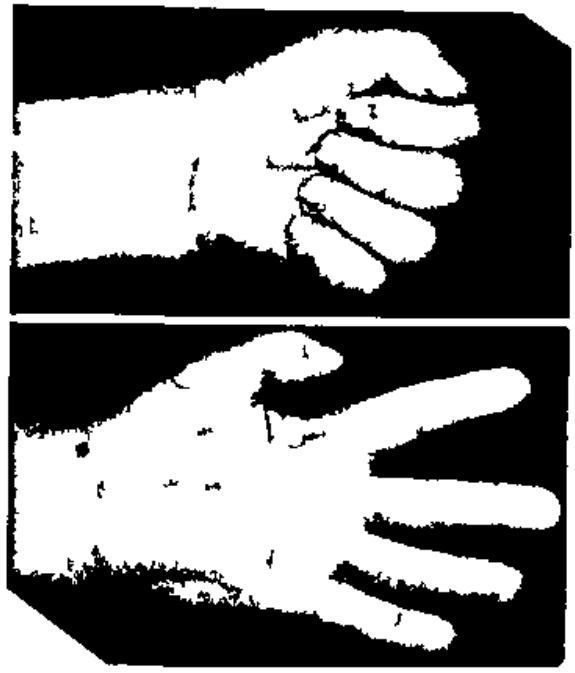


Fig 7 S ppu at e te syn vit f th n g fi g I t tw perat d po b t h s ft the n t f ympt ms Small mo t of t bi l bl d t g d fluid in the te d she th culturing t ptoc hæm lyt c Sm h d m y l ocyt d o g m Ph to-graph sh ws complete f ction



I g 8 S ppu t e te y tis f th fl o t d h th f the th mb mpl cat d by th t th int rphal g l j int P cult ed st eptococcu hæm l t cu T l d d n t sl gh D st l jo t be am kylos d ap tu lly fle d pos t pp tly th d l p iti f r the th mb i w f t mp t t ppo g act wh h th ll t

stant finding In 17 cases there was very little if any surrounding reaction In the remain ing three abscesses all located in the distal phalangeal region there was marked sur rounding inflammation probably due to the greater virulency of the infecting organism First glance seemed to indicate an anterior closed space infection but palpation gave that feel so characteristic of a subepithelial col lection of fluid Treatment consists in remov ing every part of detached epithelium and apply ing a dry or wet dressing as the case de mand As these infections are of minor sig nificance no anatomical or other impairment has ever been noted

COLLAR BUTTON ABSCESSES

This type of infection the *bouton de chemise* of the French is a definite clinical and patho logical entity and derives its name from the peculiar distribution of the pus The failure to recognize the true extent of the pathology pre ent is a frequent cause for some unduly prolonged low grade infections of the fingers and palm From a pathological standpoint the cause for the distribution of the pus is to be found in the hypertrophied epithelium at site of infection which first takes place in the subdermal tissues As the inflammatory proc ess extends the pus finally burrows through the derma producing a tiny sinus and reaches the subepidermal region where a second col lection of pus is formed The superficial ap pearance of these abscesses resembles strongly the subepithelial abscesses described in the preceding paragraph On closer examination however it is found that there is a fairly wide area of surrounding redness and swelling There is considerable induration at the region of maximum tenderness and the patient com plain of severe throbbing pain

In the 42 cases herein reported 13 occurred in the pulp of the distal phalangeal region 5 over the anterior aspect of the proximal phalanges and the remaining 24 at the distal edge of the palm In 4 cases of the latter group the infection had extended and the deeper pocket of pus included the adjacent webspace

The treatment consists in removing all de tached epithelium covering the superficial pocket identifying the sinus leading to the

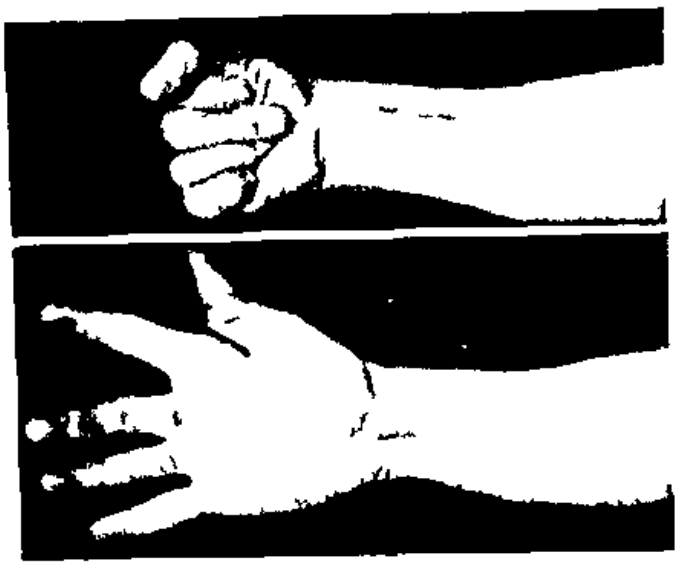
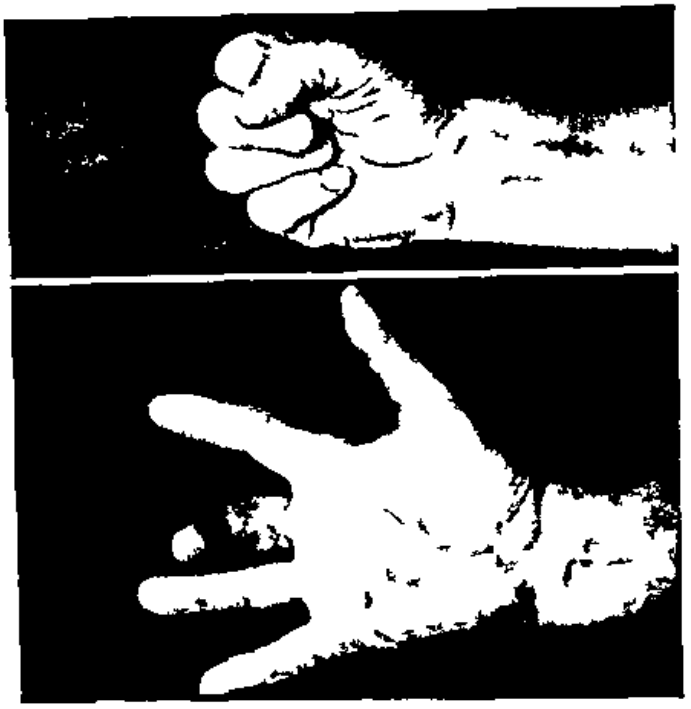


Fig 9 S pp rati te osyn itu of th mid l fing operated pon approximately 48 ho rs afte th onset f mptom Pu lt red staphylococcu a re s Th r was lso prese t suppurati e arthritis in the dist l in t rphalangeal j int Photographs ind cate the compl t funct ns in the two p ximal jo t but compl te nk lo in the d tal joint d e t th rthritu Res lt f



F g S pp ati e ten syn itis of the tend n sheath f th right middle finger f llowing an extens e traumatic w nd o the ant r surf ce of the proximal phal n xpo in th tendon Th tendon heath d kin we e t htly sut ed as a first aid dress g Patient was oper ted pon appr ximat ly 50 hours afte the set of symp- t ms Result l hing of both tendons co tractur f car nd deformity of the fi g a poor natomical d fu ti al end result This case illustrates the scar con tracti n which ften f ll ws e tensiv infected w nds at the junct on f th finger a d palm

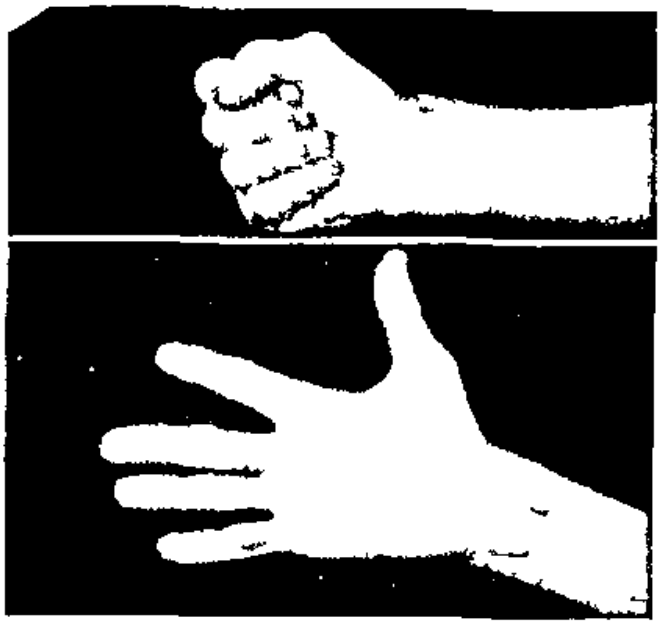
second or deeper pocket and with thi as the center point making either a linear or crucial incision large enough to drain the deep col lection adequately

Of the total 42 ca e 2 or 4 7 per cent pre ented permanent anatomical and symptom atic impairment In both instances an ap preciable part of the pulp in the region of the distal phalanx had sloughed with resultant tender deformed scars Both patients refused plastic repair in the way of a fat transplant

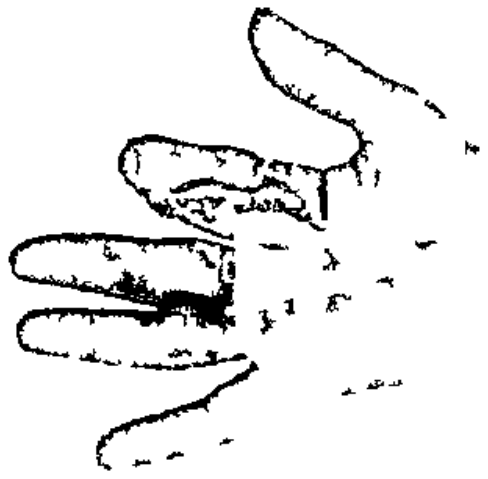
PARONYCHIA

The 40 cases of paronychia constitute 8 7 per cent of the total eries Twenty one patients presented infections localized to one ide of the paronychium In 9 of these the in fection was of the so called acute variety and was localized entirely to the subepithelial re gion of the paronychium In the remaining 12 the space beneath the nail adjacent to the paronychium was also involved In the first type a small incision over the center of the abcess alway controls the infection In the econd variety it is safer to err on the side of radicali m than to temporize and await the appearance of the more evident signs of a typi cal total paronychia or run around An in ci ion is made in the paronychial region to the outer side of the nail extending straight backward toward the distal interphalangeal joint for a di tance of three eighths to one half inch The eponychium is pushed aside with gauze and with sharp pointed scissors the corner and side of the nail base is excised To favor drainage a small strip of rubber dam or vaseline gauze is placed beneath the re flected eponychium The results in this group were universally good

There were 16 cases of complete paronychia or run around Practically all were due to neglected hangnails In every instance operation was performed under local anæs thesia consi ting of digital nerve blocking Two incisions are made one on each side of the nail as described above The eponychium i pushed back and all detached nail is excised No attempt should be made to remove the entire nail unless it i already completely separated A small strip of vaseline gauze is in erted between the eponychium and nail bed



I g S ppu ati t t f th fl ten l
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r t Th w an b f th f arm b h t th
fl t d n l po the p t q d t s m cl
Th ph t or phs sh w est t f c mpl t f t
th l ed p t C lt e m i f n th p h d
taphyl a e



F g S pp t t y t f th fl t d
h th f ll ing t um tic mp t ti th o gh th t
f th m ddl phal This ph t graph d m trates
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fu t t th m tacarp ph l g l joi t d to et f
l ml l d t m l

Two cases seen for the first time after their condition had become chronic presented fungus like exuberant granulations extending from beneath the eponychium In both instances the lateral incisions were made to favor drainage One patient promptly recovered The other after failing to respond to ordinary treatment recovered when a rubber band was applied at the base of the finger producing a Bier s hyperemia The band was worn for 48 hours

In this group there were three cases presenting permanently ridged nails as an anatomically defective end result This was due entirely to the fact that the operative incisions were not completely external to the side of the old nail thereby resulting in injury to the nail bed

In this group are also included three cases of infection localized to the eponychium a condition that may be termed eponychia The inflammatory process does not involve the nail base or subungual region A small curvilinear incision made parallel to the edge of the cuticle readily controlled the infection in each instance

CARBUNCLES

Carbuncles develop on any part of the dorsum of the hand containing hair follicles Of the 38 cases or 8 per cent of the total number 19 occurred on the dorsum of the hand more often toward the ulnar side 16 on the dorsal aspect of the proximal phalanges and 3 on the middle phalanges The peculiar anatomy of the skin with its hair and hair follicles sweat gland and ducts and columnæ adiposæ is responsible for the development of this type of pathology which must be differentiated from that of simple abscess It has been possible to do this in a great number of the cases by reason of the fact that in carbuncular infections one can almost always demonstrate the presence of one or more sinuses discharging pus in the area surrounding the region of central necrosis Also the surrounding induration is more marked and extensive Of the 38 cases 9 or 23 5 per cent received inadequate primary incisions because the true extent of the pathological process was not demonstrated *A crucial incision* when properly made should always control the infection The ends of the incisions should extend to the outside limit of the area of induration The flaps thus formed are then raised away from the underlying tissues by incisions under the skin Packing the wound

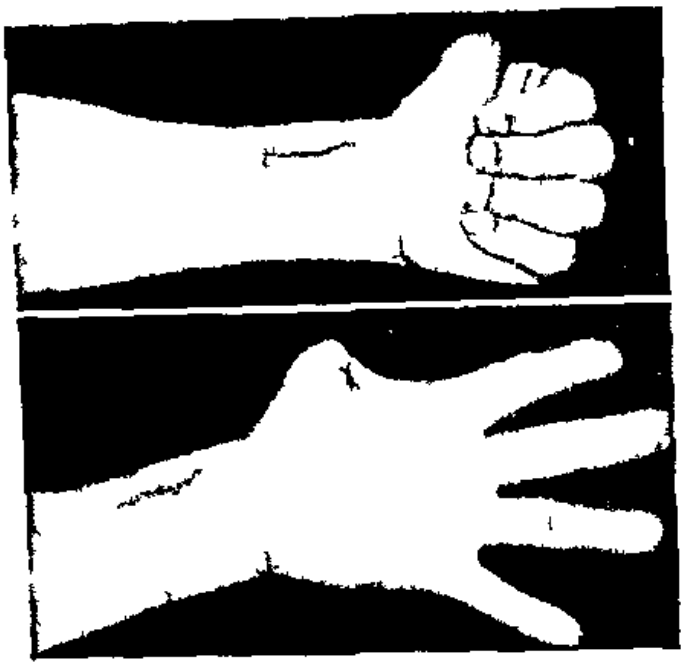
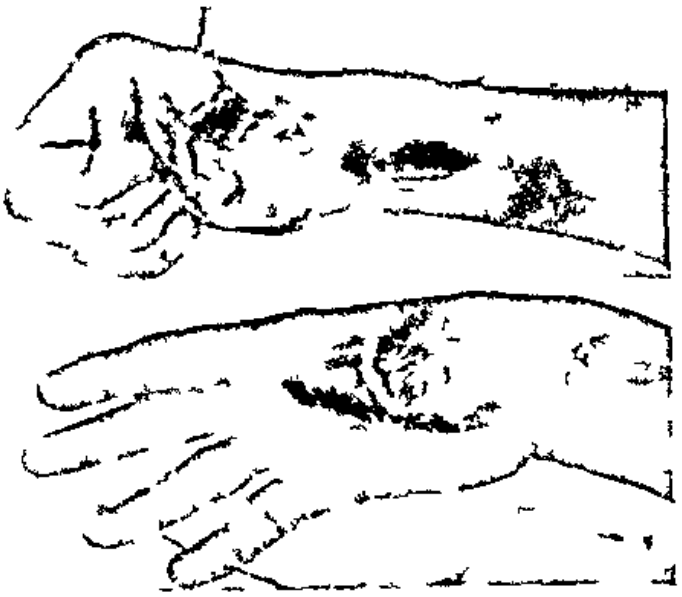


Fig 3 Inf t o f the d l bur foll ng t u m tic amp tat of the th mb Phot graphs md t the po t on f the s l ct n m l t lr the upp e d f th ad \b rsa l th compl t fun t n th f ger The e normal a g fm b l ty the wr t j t



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with gauze lifts the flap and controls the venous ooze The cutting away of any skin unless grossly sloughing is not to be recommended We quite agree with Kanavel when he says The removal of any of the skin no matter how much damaged and fragmentary should be condemned since one is always surprised at the rejuvenation of apparently hopelessly injured skin As a rule the granulating area left after the slough has separated epithelialize rapidly On four occasions where a considerable portion of the skin edges had sloughed small skin grafts would have undoubtedly hastened recovery The patients however refused to have this done Two of them 5 per cent of the entire group presented permanent anatomical and functional disability In one a man of 63 years there was 5 per cent restriction in full flexion in the metacarpophalangeal joint of the right middle finger and in the other the scar was adherent to the extensor tendon of the right ring finger preventing full flexion in the finger joints

FELONS

Anterior closed space infections constitute a most interesting group from many standpoints The question of diagnosis as to the presence or absence of pus the anatomical position of the incision the ultimate fate of an involved phalanx the plastic repair of deformed scars are a few of the numerous factors to be considered in the intelligent treatment of this form of infection There were 6 cases or 15 5 per cent of the entire series Twenty five or 40 3 per cent of the group were classified as localized infections not involving the entire space In the remaining 37 this anatomically clearly defined region was more or less completely infected From the standpoint of diagnosis here is one condition in which the subjective symptoms are of considerable importance There is intense throbbing pain limited to the distal phalanx The patient complains bitterly that he has not slept a wink for the past two or three nights The appearance of the patient walking into the office tenderly protecting the involved finger in the hollow of the palm of the other hand is quite characteristic In the early stages the entire distal phalangeal region feels tense As the infection progresses this tenseness becomes an induration with marked tenderness over the pulp In a later stage the distal phalanx becomes a boggy fluctuating mass which by now is more or less painless and insensitive When the infection is localized to one part of the anterior closed space

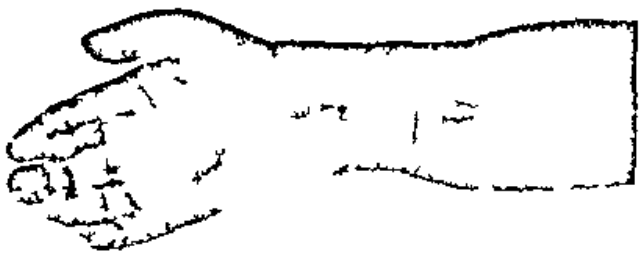


Fig 15 Showing the method of making the incision The point of the knife is inserted at the point of greatest tenderness When the pus was first reached the wound was enlarged by means of a large rubber tube sliding down to the bottom of the cavity and then spreading the blades of the hemostat in this manner The flexor tendon is shown in the middle finger The wavy lines on the thumb and the little finger show the direction of the incisions which should be made in opening abscesses of the middle palmar and thenar spaces These can be adequately drained through a large quantity of pus was found in the deep spaces of the forearm All the tendons were found to be intact This case illustrates the futility of attempting to drain deep collections of pus in the forearm through small incisions and the results from delayed diagnosis Result totally disabled hand

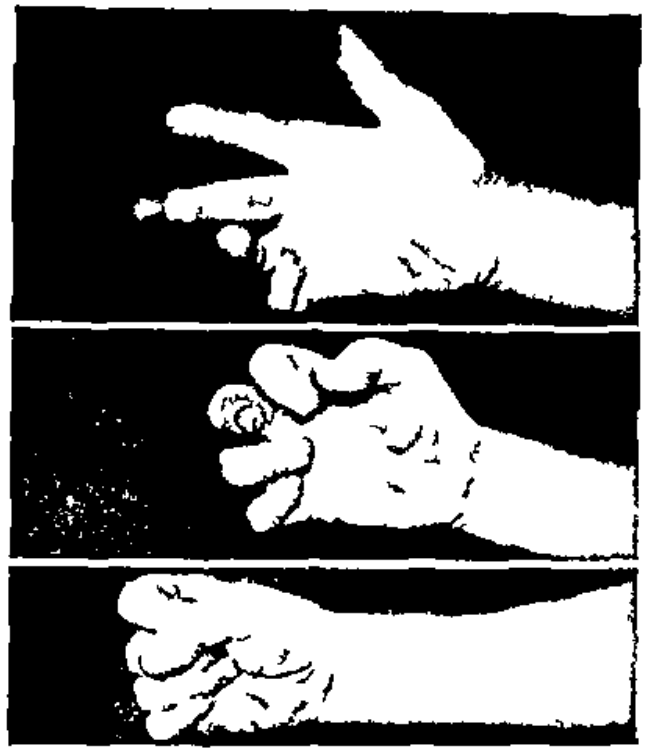


Fig 6 Infection of the palmar face The deformed irregular little finger the result of old injury The photograph discredits the freemobility of the thumb fingers the scissors of the incision made and the ability to spread the blades of the hemostat in the pulp of the finger Closure by primary suture

tenderness is most marked at that point A characteristic objective finding is the practically complete absence of swelling and redness in the remainder of the finger

In that type where the pus is well localized to one part of the space treatment consists in making an incision directly over the point of greatest tenderness When the whole space is involved the lateral incision appears to be the best because it adequately drains the infection it avoids the delicate tactile region of the pulp and leaves a painless scar In a few instances we made an incision on the opposite side establishing through and through drainage In 8 cases we were compelled to enlarge incisions *which had been made elsewhere at* the tip of the finger Palmar flaps of the pulp were thus created

Osteomyelitis of the distal phalanx occurs only when the entire space has been more or less completely involved After a study of the gross and microscopic anatomy of this region and the observation of these cases clinically we believe that Roux's explanation that bone infection is due to involvement of the lymphatics running from the skin through Sharpey's fibers to the periosteum is untenable and that Kanavel's contention that it is caused by either the shutting off of the blood supply by the œdema incident to the infection or thrombosis of the digital vessels rests on a sound anatomicopathological basis There were *21* cases of osteomyelitis of the distal phalanx an incidence of 33 8 per cent of the whole group or 56 7 per cent of these cases where the infection involved the entire space In 6 patients where a diagnosis was made on the roentgenological findings and the demonstration of bare bone by probing conservatism *resulted in early recovery Bone sequestration* did not take place In 8 cases the tuft of the distal phalanx or a part of the diaphysis necrosed and was extruded or removed as a sequestrum This occurred usually during the third or fourth week Healing then took place rapidly In 5 cases the diaphysis was completely involved and was removed by bone cutting forceps through an enlargement of the original incision In four instances one of them being

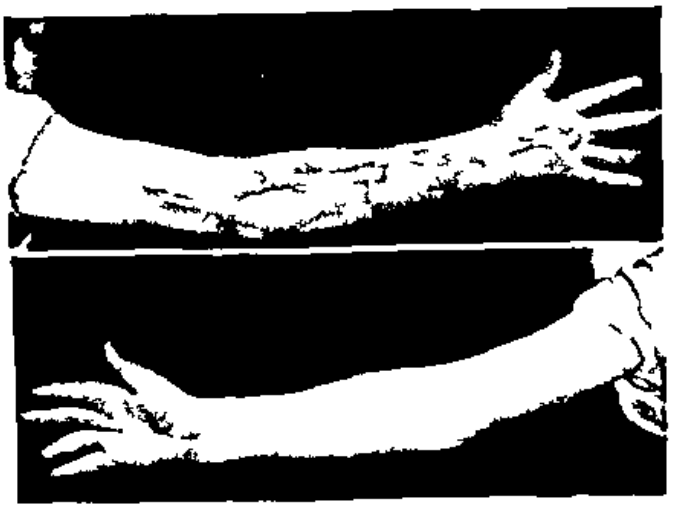
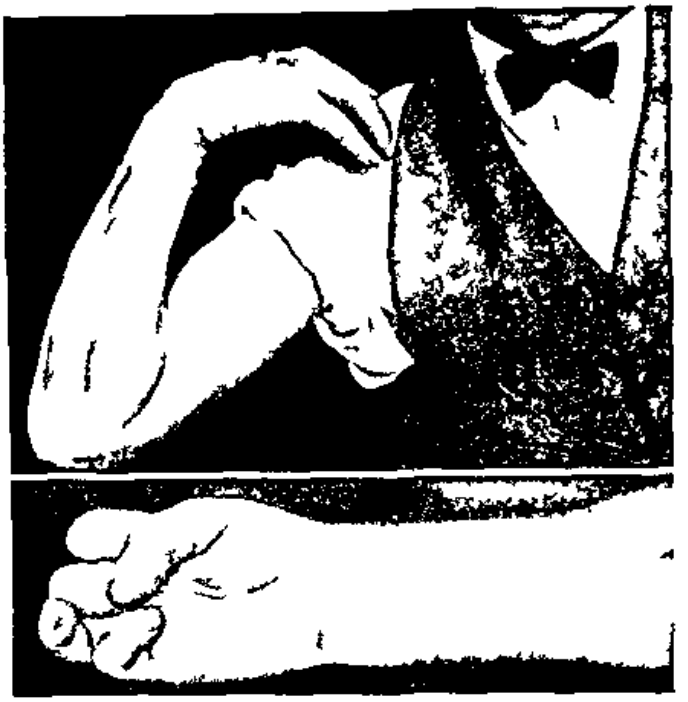


Fig 17 (bo) Case of phlegmo u lymph git d e to t ptococc hæm lyticu w th pos t e blood cultures l ti uperfi l ja cia f f r rm d rs m of hand an l rm l hed E te si ar a f kin on ba k f h nd be me g gr neces itating l t r kin grafts C se compl cated by pp rati e t osyno t s of the ring fi g t don h th d osteomy lit of th f rth met carp l bo Photogr ph hows th t scarrin a d th d f rmity f the ri g fi ger

Fig 8 S me p t ent anteri w Note ability t te d completel the thumb index middle and l ttl fin ers



F 9 \ ther w lem tratin full f ncti n the elbow d wrist joints

Fig Phot g ph f th hand of the sam pat e t as in Fgu e 9 1 d cating f ll funct in the interph l ngeal j ts b t co sid r ble imp irment in the met arpoph la geal j ts d to dense dhes ons between th tenso tend ns d th scar th d rsum f the h J

a child of 8 years subsequent roentgenographic examination showed the growth of at least part of the diaphysis In the fifth case there was no new bone formation at the end of 4 months In the remaining two patients of the total 1 there was serious involvement of the distal interphalangeal joint Amputation was performed in both patients with removal of the cartilage at the end of the middle phalanx

From the standpoint of end results therefore there were 9 patients presenting permanent anatomical or functional disability This is 14 5 per cent of the entire group In two fully 50 per cent of mobility was impaired in the distal interphalangeal joint Both patients were over 50 years of age Five cases presented shortening of the distal phalanx incident to surgical removal of the diaphysis In four of these the nail was somewhat deformed The permanent impairment in the remaining two was the result of amputation of the entire distal phalanx

In 7 cases some form of plastic operation was performed for deformed tender scars located usually at the end of the finger Three patients presented an ingrowth of epithelium into the depths of the incision a condition which was easily corrected Depressed tender scars were excised and reconstructed in two other cases Two patients one a seamstress and the other a musician presenting depressed scars with loss of a considerable part of the pulp were subjected to the fat graft operation described by Kanavel with excellent anatomical and functional results

LOCALIZED ABSCESSES IN THENAR AND HYPOTHENAR EMINENCES

Abscesses in the thenar and hypothenar eminences represent a relatively unimportant subdivision of hand infections There were 14 cases or 3 04 per cent of the total 9 occurring in the thenar region and 5 in the hypothenar space All were caused by direct inoculation usually via a puncture wound In hypothenar space infection it was noted that mobility in the fingers was always free and active Simple incision controls the infection Two patients with thenar eminence infections presented physical signs suggestive of thenar space involvement Determination of the anatomical

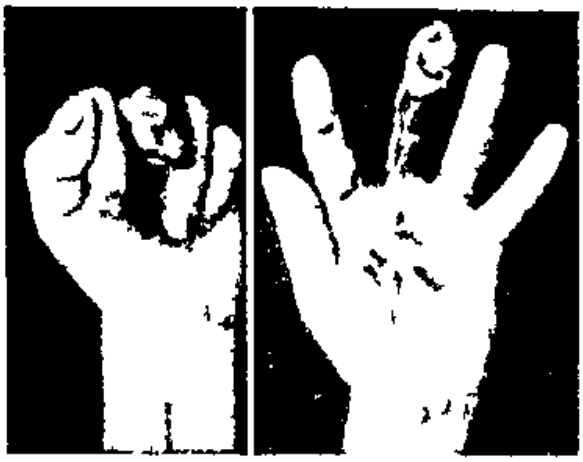


Fig. 2.—Sp[illegible] t[illegible] f[illegible] t[illegible] h[illegible] eath of th[illegible] m[illegible] ll[illegible] f[illegible] x[illegible] c[illegible] mp[illegible] t[illegible] t[illegible] f[illegible] l[illegible] th[illegible] r[illegible] s[illegible] f th[illegible] t[illegible] ft[illegible] f[illegible] ll[illegible] l[illegible] t[illegible] h[illegible] l[illegible] Th[illegible] pat[illegible] t[illegible] pe[illegible] ted[illegible] pe[illegible] pi[illegible] t[illegible] by[illegible] sh[illegible] fi[illegible] ll[illegible] set[illegible] f th[illegible] ngl[illegible] C[illegible] hu[illegible] f[illegible] ll[illegible] m[illegible] ll[illegible] n[illegible] nt[illegible] f[illegible] ll[illegible] l t[illegible] gol[illegible] ff[illegible] f[illegible] l[illegible] l[illegible] t[illegible] g[illegible] h[illegible] l[illegible] s[illegible] l[illegible] m[illegible] l[illegible] t[illegible] ou[illegible] A[illegible] m[illegible] l[illegible] ol[illegible] m[illegible] v[illegible] l[illegible] y[illegible] t[illegible] l[illegible] t[illegible] f[illegible] w[illegible] k[illegible] Th[illegible] t[illegible] g[illegible] t[illegible] k[illegible] n[illegible] th[illegible] th[illegible] p[illegible] st[illegible] pe[illegible] t[illegible] f[illegible] l[illegible] t[illegible] f[illegible] th[illegible] m[illegible] t[illegible] f[illegible] t[illegible] fl[illegible] n[illegible] tl[illegible] l[illegible] y[illegible] f[illegible] t[illegible] Th[illegible] t[illegible] l[illegible] t[illegible] m[illegible] r[illegible] t[illegible] f[illegible] m[illegible] f[illegible] t[illegible]

position of the puncture wound and the course of direction of the puncturing body coupled with the absence of marked ballooning of the thenar space were the chief points in differential diagnosis.

CHRONIC STAPHYLOCOCCUS INFECTIONS

Five cases of chronic staphylococcus infection came under our observation. Except for the local pathological lesion all were relatively normal individuals and their ages ranged from 6 to 42 years. In each instance some local cause for a continuation of the process was demonstrated and its removal brought about a speedy recovery. Two cases with lesion on the dorsum of the hand presented chronic indolent ulceration with slightly raised inflamed edges. Numerous hair follicles were the center of miliary abscesses. Attempts at epidermization were visible in scattered areas. One patient had been treating himself with bichloride wet dressing and the other with carbolic ointment. In the latter case small sequestra were seen in the center of the ulceration. Cleansing and shaving of the surrounding skin daily expose sequestra beneath a thin crust and daily dressing with a bland antiseptic ointment resulted in rapid recovery. The other three patients presented lesions on the fingers, one on the dorsal aspect and two over the anterior surface of an interphalangeal joint at the flexion crease. The cause for the chronicity in the first case was the constant immersion of the part in a solution of weak hydrochloric acid, a procedure necessitated by the patient's occupation. A resection of 2 weeks resulted in rapid healing. In the last two patients it was demonstrated that constant motion at the site of pathology kept up irritation and prevented healing. The application of a splint with bland dressing brought about prompt recovery. Three cases were examined bacteriologically and a pure culture of staphylococcus aureus was obtained in each instance.

ULCERATIVE TENOSYNOVITIS

The subject of pyogenic infection of the flexor tendon sheaths is of very great importance from many standpoints. In order that even part of the function of the involved finger and hand may be retained it is imperative that the diagnosis be made as early as possible and the proper treatment instituted immediately. After studying the 42 cases reported here and having the privilege of observing the course of about 50 other we have become convinced that if the diagnosis is made within 24 hours after the onset of symptoms and treatment instituted immediately the function of a greater number of hands will be saved. We believe that Kanavel's remark in nearly every case an early diagnosis can be made and the function of the hand saved is too sweepingly optimistic. It is agreed without argument that an early diagnosis can and should be made in nearly every case but it appears that in an appreciable proportion of the cases with optimum condition present such an early diagnosis, *cooperation on the part of* the patient and the institution of proper operative and postoperative treatment some permanent defect in function of the involved part remains. In this analysis the criterion for estimating end results is the return of complete active mobility in the hand which is involved.

Of all the various types of hand infection tenosynovitis is the most important and at the same time the most frequently badly

treated It involves a part of the human anatomy the proper use of which is an economic necessity to the patient We have seen a number of mutilated and functionally useless hands the result of faulty diagnosis and multiple ill advised and unnecessary incisions in patients to whom the loss of function meant a cessation of their former means of livelihood

One case which was seen a few years ago comes vividly to mind The patient 48 years of age an accomplished pianist and teacher developed an infection of one of his fingers following an insignificant pin prick He consulted a physician about 4 hours after the finger began to pain and swell Under novocaine anæsthesia numerous incisions apparently had been made on all aspects of the finger and dorsum of the hand in an attempt to locate the pus Similar attempts were made on subsequent occasions until the tendon sheath was opened When the case was seen about 2 weeks later the flexor tendons were sloughing and there was an infection of the middle palmar space with an osteomyelitis of the middle phalanx When this patient recovered he was compelled to change his whole mode of life which to a man of his age was little short of an economic tragedy It is desired to emphasize the fact that suppurative tenosynovitis of the flexor tendon sheath must not be considered a condition of minor importance and that its proper management constitutes one of the most difficult problems *in surgery*

Forty two cases are available here for study 10 9s per cent of the entire series Of these 36 involved the thumb 8 the index finger 9 the middle finger 7 the ring finger and 12 the little finger The size and position of the original injury appear to be of little importance as an aid in diagnosis or understanding of the pathogenesis Thus 16 patients remembered a simple pin prick over the volar or dorsal aspect of some part of the finger In 7 instances there were small wound of entry on the dorsum of either the middle or proximal phalanges The remaining 19 cases presented lacerated or incised wound of varying extent on the anterior aspect of the finger or adjacent palm In 6 of the latter group there was definite evidence of laceration of the tendon sheath with direct implantation In of these the original wound had been sutured tightly as a first aid treatment a procedure which undoubtedly hastened the development of tenosynovitis

When the symptoms and signs of tenosynovitis are sought for in an intelligent way there should be little difficulty in diagnosticating this condition It is always a question of differentiation from some other form of hand infection and the symptoms are found to be only a difference in degree from those found in simpler infections Subjectively the patient complains of severe throbbing pain in the entire finger and adjacent palm He cannot localize it to any one place On examination one finds that the involved finger is held in a rigidly semiflexed position Active mobility if at all possible is extremely painful The entire digit is uniformly swollen and on closer examination it is noted that the sides of the adjacent fingers are also swollen The dorsum of the hand is œdematous and pits on pressure The redness of the finger is not uniform but presents a mottled appearance its intensity being greatest on the side and part of the dorsum of the finger and immediately adjacent hand The whole hand is slightly tender to touch but there is exquisite tenderness localized directly over the course of the sheath and most marked at its proximal end overlying the metacarpophalangeal articulation When an attempt is made to hyperextend the finger passively great pain is produced which is again of greater intensity at the proximal end of the sheath With regard to the swelling on the back of the hand it is of great importance to realize its significance In all of the more severe hand infections the dorsum of the hand shows the greatest swelling but it is rare to find pus here In the cases coming under our observation this finding was noted only four times The failure to realize this fact is *the cause for* many ill advised and unnecessary incision

From a pathological standpoint two types of infection have been noted In one where the staphylococcus was the most frequently cultured organism the infection was localized to the with hand little if any systemic reaction There appeared to be attempts at rapid localization and walling off of the proc

ess In 3 cases adhesions had formed in the tendon sheath and the infection was definitely localized to its distal half The other type is the acute fulminating variety where the streptococcus is the causative organism The entire sheath rapidly becomes involved and the *local manifestations are severe* There is usually a toxæmia of varying intensity We have seen temperature elevations of 105 and 106 degrees F

The proper management of these cases constitutes a most difficult and puzzling surgical problem Where shall the incision be placed? *Is it better to drain? If so what form of drain* age material should be used? How long should drainage be maintained? When can active and passive motion be instituted? What other therapeutic aids can be brought into play in order to bring about a good functional end result? These are a few of the questions that *arise when one is confronted with a case of* uppurative tenosynovitis A more extensive discussion of the treatment of this condition will form the basis of a subsequent paper A few points are worthy of mention here In the first place it has been found distinctly advantageou to perform these operations in a bloodless field An Esmarch bandage properly applied is most satisactory It is removed either at the close of the operation or gradually loosened during the following hour We have never seen any untoward complication which could be attributed to the use of the Esmarch The question of anæsthesia is also very important It is felt that a general anæsthetic preferably of the gas oxygen type should always be administered Any attempt to open infected tendon sheaths under local *anæsthesia should be condemned And in this* connection we have always insisted that these patients remain in bed until the infection has been completely controlled

With respect to the proper placing of incisions it has been found that the best method of approach is from the side of the finger A study of the accompanying diagrams obviates any prolonged discussion The side incisions avoid the most frequently used anterior surface of the finger prevent the cutting of the *flexion creases produce relatively small in* conspicuous cars with minimum later contraction and at the same time can be made adequately to drain any co existent lumbrical canal *infection The incision is always started* at the side of either the proximal or middle phalanx and depending on the extent of the pathology found and the virulency of the infection is continued proximally until the end of the sheath is reached In radial and ulnar bursal infections the result of extension from the flexor sheaths of the thumb and little fingers the incisions can be extended to expose the palmar portions of these sacs After using both the continuous and segmented incisions we have come to feel that adequate drainage and certainly more rapid subsequent healing can very often be obtained when two separate incisions are used one at the side of the finger and the other directly over the palmar prolongation of the sheath However it often becomes necessary to make both incisions continuous *in order to secure more* complete drainage

As regards the use of drains in general it can be said that the number of cases of sloughing tendons and tendon sheath adhesion is almost directly proportionate to the frequency and duration of their employment The single outstanding factor in maintaining proper drainage after the first 24 hours is an adequate primary incision Beyond that time the use of a drain however flexible and innocuous it may seem to be *is rarely ever indicated*

One of the most important phases of the postoperative treatment is the prevention of contamination and secondary infection of the wounds by other organisms We feel quite sure that the chances for restoration of complete function are very greatly reduced as soon as *secondary infection occurs* To prevent this it becomes necessary to perform all post operative dressings and treatments under strictly aseptic conditions Especial reference is made to the use of sterile saline or boric acid solution as the case may be in sterile hand bath As the entire hand and wrist are considered sterile they are loosely wrapped in sterile towels between dressings It is essential to continue these precautions until the wound are nearly healed

The early institution of active and passive motion and later light massage hot wet

dressings the daily exposure of the hand beneath some form of therapeutic lamp or any other device supplying concentrated dry heat the daily painstaking dressings and the use at a later period of some form of mechanical device to promote finger mobility are a few of the therapeutic aids within our reach which tend to help restore at least some function in these fingers The important lesson we have learned from this type of case is that good results can be expected only when the minute details in the treatment are given as much prominence and attention as the apparently more important ones and this attitude must be maintained throughout until treatment is terminated

From the standpoint of the physiology bacteriology and pathology of this most interesting and extremely important subject many queries arise And we know that the answers to most of them have not as yet been obtained For instance whence does the tendon derive its blood supply? Granted a small wound of entry on the dorsum of the finger how does the tendon sheath become involved? If by the lymphatics as is so often and glibly stated what is the anatomical course of the lymphatics and how do they end in the tendon sheath? What are the causative factors in necrosis of the tendon? What is the relation between the type of organism present and the subsequent recovery with and without tendon necrosis? What relation does the number of organisms and leucocytes in the tendon sheath fluid in early cases bear toward subsequent tendon recovery or death? An experimental study along these lines has been undertaken and we hope to report our findings Of course such general questions as individual resistance of the patient to varying strains of organisms the virulency of the infecting organisms etc are involved here as in infections elsewhere in the body

As regards the extension of infection from the various tendon sheaths to the bursæ and fascial spaces the following facts were determined Of 1 cases of tenosynovitis of the little finger in 8 the process had progressed and involved the ulnar bursa before the patients came for treatment In six cases of tendon sheath infection of the thumb the radial bursa was involved in four Three of the 8 index finger infections had extended and involved the thenar space In four of the six thumb tendon infections the thenar space was the seat of abcess formation The middle palmar space was involved twice in 9 cases of middle finger tenosynovitis 3 times in seven ring finger infections and twice in 1 cases of little finger involvement

Among the later complications those of greatest importance were sloughing of the flexor tendons osteomyelitis of the middle or proximal phalanx and suppurative arthritis in the proximal interphalangeal joint Of the entire group of 42 cases 30 or 71 4 per cent sloughed some part or the whole length of both the sublimis and the profundis tendon rendering further active motion at the interphalangeal joints impossible Table II shows the relationship between the time of onset of symptoms and institution of treatment and the subsequent fate of the tendons It indicates in a graphic way the necessity of early diagnosis In 8 cases there was an osteomyelitis of varying severity and extent involving the middle or proximal phalanx The diagnosis was made by the clinical course palpation of bare bone and X ray examination The proximal phalanx was involved in 6 instances the middle phalanx in In 7 cases there was an arthritis of the proximal interphalangeal joint

When we come to analyze the end results in the cases some interesting facts are observed Of the entire group of 42 cases in 12 or 28 5 per cent there was no evidence of tendon or tendon sheath *necrosis* In 4 of these patients adhesions formed between the tendons and their sheath thereby preventing full motion at the interphalangeal joints Very little improvement followed after a prolonged course of properly administered physiotheraphy and mechanotherapy Operative interference has not been attempted to date In 6 cases there was a return of complete function in the involved fingers This amounts to 14 8 per cent of the whole group The following digits were involved One case of thumb tenosynovitis and radial bursa infection two cases of little finger infection one with and one without ulnar bursa involvement one middle fin

ger one ring finger and one index finger teno synovitis The remaining two patients at tained complete function in the metacar pophalangeal and proximal interphalangeal joints but because of an arthritis in the distal joint an ankylosis developed in this joint thereby influencing the end result The re maining 34 cases present permanent anatomi cal symptomatic and economic impairment As stated above in 4 of these the tendons were intact but adherent to their sheaths Further operative work might increa e the range of active interphalangeal mobility Nine patients were submitted to partial or total amputa tion the important indications being exten sive osteomyelitis of one or two phalanges with accompanying suppurative arthritis in the proximal interphalangeal joint and atrophy of the tissues of the whole digit with contrac ture of the scars In each case of the latter group amputation was performed at the patient s own request becau e the deformed finger interfered with occupational dutie In the remaining 1 patients there is no active motion in the interphalangeal joints but vary ing degrees of passive mobility indicating little or no pathology in the joints themselves A normal range of active flexion is present in the metacarpophalangeal joints in 1, cases a func tion made possible by the combined action of the lumbrical and intero seous muscles

INFECTIONS OF THE ULNAR BURSA

There were 12 ca es of suppurative ulnar bursitis 8 of which were extensions of the in fection from a tenosynovitis of the little fin ger The remaining 4 were due to extension from a radial bursitis The diagnosi of an involvement of this sac call for a definite knowledge of the pathology present before the extension occurred and a proper evaluation of the various objective findings Where a teno synoviti of the little finger was previously present exten ion to the ulnar bursa develops definite physical signs The most important one is an extension of the tenderness to the area involved In a few instances tendernes was found to be most marked in that portion of the bursa located above the annular liga ment The entire hand increases in size the œdema becoming more pronounced on the dorsum Whereas before extension took place the other fingers were non sensitive and freely movable now they assume a semiflexed po sition become sensitive to pressure and resist any attempt at passive hyperextension be cause of the pain produced Another impor tant finding is rigidity of the thumb and ten derness over the flexor tendon sheath and the radial bursa Thi we think is due more often to the juxtaposition of the radial and ulnar acs than to actual involvement of the radial bursa There is also noted a fullness in the palm confined to its ulnar half The general concavity of the palm however remains in tact When the wrist region is examined more carefully it is found that the hand is held in a position of moderate flexion and slight ulnar deviation The whole region i swollen and of a violaceous hue The swelling appears more marked above the annular ligament becau e of the latter s lack of distensibility The flexion creases over the anterior aspect of the wrist are now more conspicuou and the skin fold stand out more prominently A rise in temperature of from 2 to 4 degrees was seen in 9 of the 12 cases

When the question of extension of the in fection from the ulnar bursa was analyzed it was found that the middle palmar space was involved in three instances and the proximal end of the bursa had ruptured in 5 cases with secondary deep forearm absce s formation In 4 cases one third of the total number the radial bursa became involved These figures agree approximately with Forssell s who found 6 in 29 cases It has been our experience al though the number of cases i small that Kanavel s 75 to 85 per cent of secondary in volvement of the radial bursa from a primary ulnar bur iti is somewhat high The dia nostic points of exten ion to these fascial paces and synovial sacs will be taken up un der their respective heading

The treatment here as in tenosynoviti call for properly placed adequate incision Figure 2 shows the anatomical positions of the various incisions in the hand and above the wri t It is our desire to emphasize the fact that the prolongation of the bursa above the wri t cannot be drained by an incision over the front of the wrist becaus it then become

necessary to separate the various tendons and introduce drainage material to keep the wound open a procedure which helps materially in bringing about tendon necrosis Figure 15 represents such a case in which an attempt had been made to drain the deep spaces of the forearm by such incisions This patient was first seen after a number of the flexor tendons at the wrist had sloughed Needless to say this hand is totally useless Properly placed long ulnar side incisions will drain very satisfactorily the deeply situated bursa The dictum a large incision with free drainage will heal more rapidly than a small incision with inadequate drainage is particularly applicable here After the first 24 hours all drainage material is dispensed with Its use is very rarely indicated after that period On two occasions it was found necessary to split the anterior annular ligament in order to properly drain virulent infections involving both the ulnar and radial bursæ With the hand splinted for a few days in hyperextension prolapse of the tendons did not occur and no untoward later effects were noted which could be attributed to the cutting of this structure *per se*

It is difficult to properly evaluate the end results in this type of infection because of the concomitant involvement of one or more of the tendon sheaths that is those of the little finger and thumb However it appears that the function in the wrist joint and the other fingers must be determined because of the proximity of the former and the tendon sheath of the latter to the ulnar bursa In 8 of the 12 cases the wrist joint has remained practically unimpaired An impairment ranging from 20 to 50 per cent especially as regards extension was noted as an anatomically defective end result in the remaining four In 7 patients there has remained some permanent decrease in the range of active flexion of the index middle and ring fingers varying from 10 to 30 per cent This is presumably due to the presence of scar tissue about the proximal ends of their vaginal sheaths

RADIAL BURSA INFECTIONS

Of the 10 cases of radial bursa infection 4 were due to extension from a tenosynovitis of the thumb 4 were caused by a preexisting ulnar bursitis and 2 were the result of traumatic amputations of the thumb with secondary infection As in ulnar bursitis the symptoms and signs are here also quite distinctive When extension occurs from a thumb tenosynovitis the patient notices an increase in the area of pain including the thenar eminence and the wrist On examination one finds that the thumb is held rigidly in semiflexion and the entire thenar eminence is swollen the latter lacking however the great ballooning out so characteristic of thenar space infection The redness is mottled in appearance and distributed over the entire thumb thenar eminence and anterior aspect of the wrist where it assumes a violaceous tinge The œdema on the dorsum of the hand becomes more pronounced The entire thenar eminence is tender As in ulnar bursitis tenderness was found to be most marked in two or three instances at the proximal end of the sac above the wrist It is further noted that the hand is held in moderate flexion and radial deviation An important negative finding is the absence of pain and the relative freedom of motion in the other fingers especially the ring and little fingers The sudden development of some pain in these fingers and the assumption of a position of rigid semiflexion resisting extension coupled with a progression of the area of tenderness both in the hand and above the wrist means one thing only a secondary involvement of the ulnar bursa In these 10 cases this complication occurred 4 times a percentage somewhat lower than that mentioned by Kanavel and Forssell Other paths of extension included 4 cases of thenar space infection and 4 of rupture of the proximal end of the sac with secondary deep forearm abscesses beneath the flexor profundis tendons

From the standpoint of treatment the incisions must be radical properly placed and carefully made In the hand the incision starts over the proximal phalanx of the thumb more toward its ulnar side and continues around into the thenar eminence running somewhat parallel to the adduction crease The two heads of the flexor brevis pollicis muscle are separated and ready access is gained to the bursa The muscular structures making the thenar eminence should not be

ruthlessly divided because the important apposing function of the thumb depends upon their preservation The precaution of avoiding injury to the nerve supplying these muscles by ending the incision at a point 1 inch distal to the anterior annular ligament makes also for better later function When the findings indicate an extension above the wrist the external lateral incision secures adequate drainage Here particular care must be taken to avoid injury to the radial artery The anatomical position of this incision is not without danger One of these 10 cases on the *third postoperative day* had a severe secondary hemorrhage from necrosis of the wall of the radial artery The timely and intelligent interference of the nurse prevented a rapid exitus The artery was later exposed and ligated successfully To drain a radial bursa infection alone even with extension above the wrist we do not think it is ever necessary to split the annular ligament If the involved tendons are grossly necrotic or have been the seat of infection for some time they should be excised because the period of suppuration is greatly decreased and the other important structures beneath the annular ligament are less liable to further damage

As in ulnar bursitis the end results in this condition are intimately connected with the *final outcome in the frequently associated* tenosynovitis of the thumb or little finger Mobility in the wrist joint remained practically unimpaired in all the cases In 4 of the 10 patients 40 per cent there was a noticeable impairment in the apposing action of the thumb Except when the ulnar bursa became secondarily involved mobility in the fingers remained normal The question of tendon necrosis both in ulnar and radial bursitis was discussed in the section on tenosynovitis

THENAR SPACE INFECTION

Definite thenar space infection was encountered 17 times 3 7 per cent of the entire series Of these 3 were caused by extension from a suppurative tenosynovitis of the index finger 4 were secondary to tenosynovitis of the thumb 4 were due presumably to extension from a radial bursitis and 6 were definitely caused by direct inoculation In the latter group *there were 4 cases with deep puncture wounds* on the dorsum of the first web region and 2 with compound fractures of the metacarpal bone of the index finger The thenar space abscesses in the last 2 cases were secondary complications diagnosed respectively 6 and 11 days after the original injury In this connection it might be stated that we have never seen an infection of the thenar space which could be traced definitely to a preexisting middle palmar space abscess On the other hand we have seen 3 cases where the spaces were simultaneously involved but presumably from different sources

The signs and symptoms of this very definite clinical entity might be reviewed quite satisfactorily by a description of the findings in a recent case

CASE 1 Mr C L age 31 5 days ago while working at a buzz saw sustained an injury to the right hand when a narrow piece of wood was fired back and pierced it The wound of entry was located *on the dorsum of the hand over the first interosseous* space the direction of the foreign body apparently being forward and inward toward the center of the palm The splinter of wood was removed as a first aid treatment and a dressing applied During the *succeeding 3 days the patient experienced severe* throbbing pain in the hand most marked in the region of the thenar eminence This was accompanied by a progressive increase in size of the hand On examination the following was noted Although the entire hand was swollen the thenar eminence stood out markedly giving the appearance of capacity distention The entire thumb seemed to stand away from the rest of the hand with the terminal phalanx held in a position of acute flexion The edema on the dorsum of the hand was quite pronounced *Active and passive motion in all the fingers* was free although some restriction was noted in the thumb and index finger The latter was not the rigidity noted in ten synovitis The entire thenar eminence the adjacent web space and back of the hand *and the thumb displayed a uniformly light red* slightly cyanotic color Tenderness was most marked *over the prominent thenar eminence* and along the web between the thumb and index finger A most noticeable objective finding was the definite induration of the whole thenar area This is a most important point in differentiating thenar space abscess from the œdema present when the middle palmar space is involved On admission to the hospital the temperature was 103 4 degrees F Under gas-oxygen anæsthesia the space was drained and about 1½ ounces of pus liberated *A small rubber dam drain* was inserted down to the bottom of the space With hot saline wet dressings for twenty four hours rest in bed and catharsis the swelling promptly sub

sided and drainage decreased The operative wound was healed in 2 weeks and there was a restoration of complete function

The most important step in the treatment once the position of the pus is definitely determined is the proper placing of the incision It has been found that the space can be drained most satisfactorily at the same time avoiding injury to the intrinsic muscles of the thumb by making the incision over the first dorsal interosseous space running it parallel to and at about the center of the metacarpal bone of the index finger An artery clamp is then inserted anterior to the index metacarpal and the entire space opened widely It is to be remembered that the limit of the thenar space in the palm is the origin of the adductor transversus muscle from the anterior surface of the shaft of the middle finger metacarpal Care must be taken not to push the artery clamp through the muscle into the mid palmar space The pus may be either in front of the adductor transversus pollicis muscle or upon both its dorsal and ventral aspects Subsequent drainage is maintained by the use of rubber dam or rubber tissue strips or vaselinized gauze the drain being carried down to the bottom of the space The duration of drainage will depend on the course of each individual case In the majority of cases it is seldom necessary after the third day

Only 4 instances of extension of the infection from the thenar space were seen These took place along the lumbrical canal of the index finger and the tissues about its flexor sheath or the web region between the thumb and index finger became involved We have never seen a case of extension from the thenar space to the mid palmar space On the other hand secondary involvement of the thenar space from a primary mid palmar space infection would seem to be more easy of development although we have never seen such an instance

Even in relatively late case there is no reason why complete restoration of function should not follow if the incision is properly placed and the postoperative care is carefully followed out Of course in a number of cases the end result is dependent upon the outcome of the infection in adjacent structures Thus in this series the preexisting infection of the index finger flexor tendon in 3 cases and the thumb tendon in 4 cases decided the permanent impairment in the hand if any remained After a careful analysis and study of the cases here recorded one could not plausibly determine any permanent anatomical (including scar contraction) or symptomatic disability which could be attributed to the thenar space infection *per se*

INFECTIONS OF THE MIDDLE PALMAR SPACE

Next to suppurative tenosynovitis infections of the middle palmar space are most frequently overlooked or incorrectly diagnosed There are many reasons for this In the first place the space is so deeply situated that coupled with the superimposed relatively non resistant palmar fascia the physical signs are not as distinctive as in infections of the tendon sheaths or the thenar space Then again the signs and symptoms of the preexisting or simultaneous infection of one of the tendon sheaths or the presence of some crushing injury to the hand may overshadow the mid palmar infection And lastly it appears that the exact anatomical position and extent of this space is not known and recognized as universally as it should be As demonstrated by Kanavel's experimental injection studies this space is situated in the palm of the hand dorsal to the flexor tendons that is behind them and has the general appearance and shape of an inverted truncated cone the broad base being directed distally toward the fingers the smaller end toward the wrist Externally it is limited by the origin of the adductor transversus pollicis muscle from the anterior surface of the middle finger metacarpal this muscle serving as a partition between the thenar and palmar spaces Internally it is overlaid by the distal half of the ulnar bursa and extends as far as the outer side of the little finger metacarpal Its distal extremity may be represented externally by the inner extremity of the distal palmar crease and its proximal end is located in the region of the bases of the third and fourth metacarpals

Whether the infection is due to extension from a tenosynovitis or to direct implanta

tion following an injury the physical signs are the same If sought for carefully and intelligently bearing in mind the previous history of the case diagnosis ought not to be difficult The patient's complaints are severe throbbing pain most marked in the palm and a rapid increase in size of the hand Objectively one find that the dorsum is markedly œdematous The palm the web spaces between the middle ring and little fingers and the adjacent dorsum present a livid appearance The outstanding single objective finding is the *loss of the concavity of the palm which now appears to bulge* This is best seen by viewing the hand from the side Because of the anatomical proximity of the tendon sheaths of the middle ring and little fingers to the space these digits assume a rigid semiflexed position However this rigidity is relative inasmuch as the fingers can be extended and flexed rather freely thereby *differentiating this infection* from tenosynovitis The thenar eminence because of the laxity of its tissues is swollen But this swelling is of the soft œdematous variety as *differentiated from the firm induration* seen in thenar space infection Palpation reveals induration in the palm and tenderness most marked over the anatomical position of the space Fluctuation can seldom be obtained because of the deep position of the pus

As in thenar space infection the most important phase of the treatment is a properly placed adequate primary incision We have used the incision recommended by Kanavel in every case with entire satisfaction Figure 3 represents the outline of the space and the incisions used It can be extended distally to drain any involvement of the lumbrical canal If the inner lumbrical space is infected it would seem best to incise between the fourth and fifth metacarpals and drain both spaces through the same incision The flexor tendon sheaths are pushed aside and an artery clamp is inserted beneath them into the space When the blades are separated satisfactory drainage ensues A strip of rubber tissue or rubber dam is then inserted The postoperative treatment is the same as in thenar space infection We have been impressed with the rapidity of recovery in these cases once the proper incision was made Just as soon as it is evident that the infection has abated light massage should be instituted This tends to prevent adhesion about the superimposed flexor tendon sheaths

Fifteen cases of this type of infection were observed Three were definitely the result of extension from an ulnar bursitis 2 were caused by a pre existing little finger tenosynovitis 2 from a middle finger and 3 from a ring finger tendon sheath infection Of the remaining 5 3 gave histories indicating either deep puncture wound or deep lacerations and 2 had crushing injuries of the hand with compound fractures of the metacarpal bones of the ring and little fingers respectively In one of the latter cases there was also an infection of the subaponeurotic space on the dorsum of the hand and through and through drainage between the third and fourth metacarpals was employed In the majority of cases one or both associated lumbrical canals were also *involved With regard to other paths of extension* we have never seen instances of secondary thenar space ulnar bursa or deep forearm involvement Barring the case of crushing *injury with compound fracture of one of the* metacarpals burrowing of the pus between the metacarpals to the dorsum of the hand was never observed

End results as in thenar space infections are in the majority of case intimately associated with the final outcome of the accompanying tenosynovitis or bursitis However in uncomplicated cases of middle palmar space infection there is no reason why there should not be a return of complete function in the great majority In our 5 uncomplicated cases complete restoration of function was obtained in 4 or 80 per cent In the fifth where a compound fracture and osteomyelitis of the fourth metacarpal preceded the development of the mid palmar abscess there remained about 50 per cent impairment of full flexion at the metacarpophalangeal and interphalangeal joints of the right ring finger This is due possibly to adhesions about the flexor tendon sheaths or to secondary changes in the joints themselves

DEEP FOREARM INFECTIONS

Kanavel's studies demonstrate in a most conclusive manner that *accumulations* of pus in the forearm follow definite anatomical

fascial planes and that nearly every case of deep forearm abscess can be traced to some antedating infection of the hand usually a radial or ulnar bursitis Our experience with 9 cases would tend to bear out his findings and contentions Thus of these 9 cases 5 were due to extension from an ulnar bursitis and 4 were caused by rupture of a previously infected radial bursa In this connection it might be stated that we have never seen a case of forearm infection secondary to a thenar or middle palmar space infection In 6 patients the upper limit of extension was approximately the middle of the forearm In the remaining 3 practically the entire anterior compartment of the forearm was involved

When an ulnar or radial bursitis ruptures and the forearm becomes involved the pus comes to lie behind the flexor profundis digitorum tendons and upon the pronator quadratus muscle It occupies a fairly large sized space approximately or 3 inches above the wrist joint With extension of the infection the pus is found lying on the interosseous membrane About 4 or 5 inches up on the forearm the pus tends to leave its deep position and follow intermuscular septa most commonly that one between the flexor carpi ulnaris and the flexor sublimis digitorum muscles It then passes into the sheaths surrounding the ulnar artery and nerve on the one hand and the median nerve on the other Its further course is along the vessels and nerves It may extend toward the elbow following most often the course of the median nerve In the majority of cases however it seems the pus proceeds distally along the ulnar vessels and nerve and comes to lie subcutaneously just above the wrist The great probability of a deep collection of pus must be borne in mind when confronted with such a subcutaneous infection over the front of the wrist sequential to a radial or ulnar bursitis These subcutaneous collections are found only in relatively late cases

With the knowledge of the history concerning the beginning of the infection in the hand and the physical signs diagnosis should not be difficult The entire forearm increases in size The swelling presents not particularly indurated but on palpation gives the sensation of tenseness as if the forearm were overdistended It does not pit on pressure The wrist becomes fixed in a position of semiflexion Any attempt at extension causes considerable pain The skin is slightly cyanotic more marked at the wrist and gradually shading off in the direction of the elbow Deep pressure over the anterior part of the forearm elicits pain As the infection progresses the skin becomes reddened and induration is then noted In early cases fluctuation can never be obtained because of the deep position of the pus Later fluctuation is demonstrable when the subcutaneous tissues above the wrist become involved Other important clinical findings are elevation of the temperature and a rise in the total and polymorphonuclear leucocyte count

Both from the mechanical and anatomical aspects it appears evident that adequate and continued drainage cannot be obtained by incisions made over the front of the wrist Inasmuch as the pus is deeply situated and overlaid by the various flexor muscles and tendons anterior incisions must of necessity be long must involve cutting and separation of muscle bellies and tendons and require the use of semirigid drainage material in order to maintain drainage This favors necrosis of fascia and tendons and prolongs convalescence Figure 15 represents a case treated in this way

In the other 8 cases the use of the side incisions gave equally good drainage and rapid recovery (Fig 4) When the infection has extended upward toward the middle of the forearm the incision is made on the ulnar side also but about an inch toward the anterior surface This is done in order to reach the intermuscular septum between the flexor carpi ulnaris and the flexor sublimis digitorum muscles Drainage material usually rubber dam or vaselinized gauze is seldom needed after 36 hours

With the exception of the one case represented by Figure 15 the end results were universally good In 4 cases we observed that there was a noticeable loss in muscle strength that is grasping power of the hand This condition eventually cleared up in greater part Not one case of wrist joint involvement

was encountered in this series Secondary hæmorrhage was never observed aside from that case described in the chapter on radial bursitis of necrosis of the radial artery

SUPPURATIVE TENOSYNOVITIS OF COMMON EXTENSOR TENDON SHEATH

A pyogenic infection of the common extensor tendon sheath seems to be an uncommon condition Kanavel reports having seen 4 cases Two were encountered in this series Their histories bring out a number of interesting points

CASE 2 Mrs L M age 37 five days ago while opening a can of food cut the dorsum of her left hand on the edge of the can A fairly deep wound was produced but the extensor tendons were not injured Two days later the patient began to experience *marked pain about the wound accompanied by rapid* swelling and restriction in flexion of the fingers and wrist joint Examination showed a transverse irregular lacerated wound about 2 5 centimeters in length on the dorsum of the left hand 2 5 centimeters distal to the wrist joint The entire dorsum of the hand wrist and lower forearm was swollen and red There was exquisite tenderness over the dorsum of the wrist carpus and adjacent hand Pus oozed from the wound when pressure was applied in these regions The fingers were held in the extended position and the wrist joint was slightly dorsiflexed Attempted active or passive motion in the fingers caused pain The temperature was 101 4 degrees F Under general anæsthesia a longitudinal incision was made on the dorsum extending from about the center of the middle metacarpal bone backward as far as the wrist joint The posterior annular ligament was split Pus was found in the tendon sheath Two small rubber dam drains were placed in the lateral parts of the sheath and the hand and wrist were immobilized on an anterior splint *Following this procedure the temperature* dropped to normal and the subjective symptoms abated The drains were removed at the end of 48 hours and the palmar splint was dispensed with on the fourth day When the infection had subsided active motion and light massage were instituted *The operative wound was healed in 2 weeks* Convalescence proceeded rapidly and the patient now 9 months later has a normally functionating hand

CASE 3 T S man age 46 about one week before ran a nail into the back of his hand The wound was iodinized and he paid no more attention to it About 3 days later he began to experience considerable difficulty in active motion of the fingers This he attributed to the already present swelling on the dorsum of the hand Aside from a dull ache in the region of the wrist the patient experienced no pain and had been able to sleep each night Examination of the right hand showed considerable swelling on the dorsum of the hand and wrist The skin was slightly cyanosed Palpation revealed some tenderness over the dorsum of the carpus on very firm *pressure The tissues felt indurated* The fingers were extended but could be flexed somewhat Mobility at the wrist was fairly free The temperature was 99 degrees F As the true extent of the pathology was not surmised *conservative treatment* was instituted Instead of subsiding the swelling increased and greater pain was experienced Because of the increasing induration it was felt that an incision was in order The ante operative diagnosis was abscess of the dorsal subcutaneous space A longitudinal incision over about the center of the hand showed nothing but œdematous subcutaneous tissues Extending the incision toward the wrist the *extensor sheath was exposed and nicked A small* quantity of pus escaped The entire sheath was then split from its proximal to its distal end and the annular ligament was also divided This patient went on to a rapid recovery without sloughing of any of the tendons and with a restoration of complete function

In considering the surgical aspects of pyo*genic infections of the dorsal tendon sheath* the following facts may be noted

1 Anatomically the sheath embraces the tendons of the extensor communis digitorum and the extensor indicis muscles It is located rather far back on the hand extending from about the upper edge of the posterior annular ligament distally for a distance of 5 to 6 centimeters

2 The physical signs are not nearly as distinctive as those of flexor tenosynovitis

3 If the sheath should rupture the pus would tend to diffuse in either the dorsal subcutaneous or subaponeurotic spaces probably more often in the former The absence of definite fascial planes and spaces on the dorsum of the wrist and forearm into which the infection could extend greatly simplifies con*ditions in this respect differing markedly from* infections on the anterior aspect

4 Simple longitudinal splitting of the sheath seems to control the infection

5 It is rather uncommon to see sloughing of any of the extensor tendons This brings up the as yet unanswered query What is the difference between the flexor and extensor sheath infections and what are the factors involved which make for the usually rapid and complete recovery in extensor sheath infec*tions as opposed to the prolonged course and*

relatively infrequent complete return of function in the flexor sheath infections?

SECONDARY OSTEOMYELITIS

Of the 29 cases of secondary osteomyelitis 1 had an osteomyelitis of the distal phalanx They were analyzed in the section on felons The remaining 8 cases form an altogether different group clinically and pathologically All were secondary complications of a preexisting tenosynovitis Any patient presenting a chronic discharging sinus over the middle or proximal phalanx following suppurative tenosynovitis of the flexor tendon sheath may be sure to have either a sloughing tendon an osteomyelitis of one or both phalanges or a suppurative arthritis in the proximal interphalangeal joint Frequently all three are present together More often a sloughing tendon and an osteomyelitis are combined In 4 of the e cases there was extensive destruction of both the proximal and middle phalanges as well as the proximal interphalangeal joint and amputation was performed in each instance In the remaining 4 patients the middle phalanx displayed infections varying from a cortical osteomyelitis of the shaft to destruction of the entire proximal end Three cases had an arthritis in the proximal joint The first patient promptly recovered after extruding a small sequestrum from the anterior surface of the middle phalanx In the remaining 3 it was found necessary to remove the proximal end of the middle phalanx At operation it was noted what remarkably little change had occurred in the head of the proximal phalanx even in the face of an arthritis of the proximal joint The after treatment in these cases consisted of traction and extension on a palmar splint The wound healed after 3 to 4 weeks with complete ankylosis of the proximal interphalangeal joint

The end results then may thus be summarized Of 8 cases 4 came to amputation because of extensive disease One recovered without loss of any appreciable part of the phalanx and without actual impairment of the joints The remaining 3 showed an anatomical loss of the proximal one third of the middle phalanx with an ankylosis of the proximal interphalangeal joint In addition to this some shortening of the finger was evident in each case

The diagnostic features of phalangeal osteomyelitis may thus be enumerated

1 The sequence of events in the history of the case

2 The clinical course while the patient is under observation

3 The presence of sinuses consisting of volcano like appearing flabby granulation tissue with a central crater leading down to the site of pathology

4 The exclusion of other causes of chronic sinuses such as sloughing tendons foreign material (drains) etc

5 The determination of bare bone by probing

6 Roentgenographic examination

In the treatment of these cases it appears that a certain proportion will go on to a satisfactory outcome with conservatism This is true especially of diaphyseal osteomyelitis and uncomplicated suppurative arthritis If there is gross destruction of the phalanges and the proximal joint for the majority of patients the best treatment is amputation Sometimes whether for cosmetic or other reasons the involved phalanges may be resected and a fair result obtained When the thumb is the involved digit we feel that everything possible should be done before amputation is resorted to because the appositing action of the thumb be it only a part of its former self is one of the most important actions in the hand

INFECTIONS OF THE PALMAR FASCIA

Infection of the palmar fascia apparently of some rarity was seen on two occasions It is characterized by an infection of the palmar fascia involving both its superficial and deep surfaces and results ultimately in sloughing of a part or the whole of this fascial layer In one case observed the entire fascia with its digitations going to the fingers was found at operation to be completely separated from its superficial and deep attachments and was removed practically *en bloc* The other patient showed necrosis of only a part of the proximal and of the palmar fascia The histories in detail are as follows

Case 4 E Camp age 62 one week before admission injured his right hand when a piece of wood pierced the palm near the wrist The splinter was removed but the hand began to pain and swell No treatment of any sort was received during the first week Examination showed an infected puncture wound discharging pus in the palm just distal to the wrist The entire palm was swollen and its normal concavity was replaced by a convexity The skin of the palm was shiny and red Swelling on the dorsum of the hand was enormous Palpation revealed greatest tenderness in the palm at its base and gave the sensation of a palm filled with fluid Finger mobility in the index and middle fingers was fairly free The ring and little fingers were deformed as a result of a former injury The temperature was 101 degrees F The apparent superficial location of the pus and the anatomic position of the original puncture wound were the main points in differentiating this condition from an infection of the mid palmar space Operation showed that the palmar fascia was completely separated from the subcutaneous tissues on its superficial surface and from the intrinsic hand muscles on its deep aspect *In each space thus formed was a small lake of pus* The fascia grossly necrotic lay between them Numerous incisions were made and the fascia was excised In 4 weeks all wounds were healed and full function had returned (Fig 16) It is interesting to note that the ability to produce a hollow in the palm of the hand is only partially lost Anatomists contend that the palmaris longus muscle through its palmar fascial expansion is the main factor in this action

Case 5 A boy age 19 gave a history almost identical to that in Case 4 Five days before the patient sustained a puncture wound in the right palm at its base This was followed by an infection for which a small incision had been made elsewhere Improvement did not follow this procedure Examination showed a small incision in the right palm at the proximal end of the adduction crease The surrounding palm was swollen red and tender The general palmar concavity however was intact Finger mobility was good and swelling on the dorsum of the hand was not excessive The temperature was 100 8 degrees F Operation revealed the presence of a small abscess consisting of two pockets the proximal end of the palmar fascia forming the septum between them About one half ounce of pus was evacuated and the grossly necrotic fascia excised When the patient left the hospital 3 days later the swelling had subsided but the wound was still draining He did not return for further treatment In this case there was considerable tenderness along the course of the ulnar bursa which with the general fullness of the palm rendered diagnosis somewhat difficult

Cultures of the pus in both cases showed the presence of staphylococcus aureus Interest in this condition attaches mainly to the differential diagnosis from the bursal and fascial space infections to the peculiar pathology found at operation and the rarity of the disease Simple incision over the point of greatest tenderness with excision of the necrosed fascia seems to form the basis of treatment

PHLEGMONOUS LYMPHANGITIS

It did not appear advisable or necessary to analyze all the cases of lymphangitis and discuss them under a separate heading for the reason that a large number of the local hand infections were accompanied by some degree of lymphangitis of the hand and forearm and lymphadenitis of either the epitrochlear or axillary glands *The cases of local lymphangitis* confined to the hand mainly have been discussed under the heading of simple abscesses It is our purpose in this section to speak of another form of lymphangitis one characterized by severe local and often general manifestations in which there is an appreciable mortality rate

The point of origin is usually an insignificant wound on some part of the fingers or hand With this as a focus the infection spread *rapidly and appears to be confined to the lymphatics* of the skin and subcutaneous tissues on the dorsum of the hand and forearm Instead of the soft pink pitting œdema which accompanies the simple lymphangitis the great swelling which follows the onset of the infection is indurated and *bluish in color* The skin soon becomes covered with small vesicles and presents an appearance suggestive of erysipelas The patient complains of severe throbbing pain in the involved parts and presents clinical evidence of an intoxication of varying severity with high temperature chills prostration anorexia etc Locally one find none of the symptoms and signs of tendon sheath or fascial space infection Whether the symptoms of the lymphangitis overshadow possible infections in these regions or secondary infection occurs at a later period it has been noted that these spaces do show evidences of infection in a number of cases at some later stage of the disease The characteristic finding is the bluish firm indurated swelling of *the superficial tissues* on the dorsum of the hand and forearm sometimes extending to the shoulder In the pres

ence of such an infection incision is indicated for it is found that the skin is completely undermined by pus and the subcutaneous tissues and superficial fascia are grossly necrotic and can be removed in large pieces In some cases the entire superficial fascia of the forearm and back of the hand becomes necrotic In the presence of this necrosis the vitality of the overlying skin becomes impaired and soon isolated areas of skin gangrene are visible and they coalesce or individually increase in size until sometimes extensive parts of the hand and forearm become denuded of skin necessitating either prolonged convalescence or secondary skin grafting In some cases the infection may be so severe as to overwhelm the patient In this group occurred the only death of the entire series From the bacteriological standpoint it appears that the streptococcus family of organisms is the most common with the staphylococcus aureus the next most frequent

Four cases of this type of infection were encountered All were male patients ranging in age from 36 to 65 years Two of them had relatively low grade staphylococcus aureus infections which involved the dorsum of the hand wrist and distal two thirds of the forearm Although there were large quantities of pus beneath the skin necrosis of the fascia and subcutaneous tissues was not advanced In one patient an area of skin on the back of the hand measuring about 3 centimeters in diameter became gangrenous Skin grafting was not done In this case there remains a permanent decrease of mobility at the metacarpophalangeal joints of all the fingers amounting to 50 per cent a fair anatomic end result The other patient recovered with a restoration of complete function

The third case was an old Italian 65 years of age in poor physical condition He presented an extensive involvement of the hand and forearm which rapidly extended to the arm and shoulder The streptococcus hæmolyticus was isolated in pure culture As the infection progressed new incisions were made but it seemed that neither the patient nor surgery could control its advance The septic course continued in spite of adequate drainage and repeated transfusions As the patient rapidly grew weaker the infection spread along the right side of the chest wall He died suddenly 4 weeks after admission to the hospital following a severe hæmorrhage due to erosion of one of the vessels in the back muscles

As the fourth case presents many interesting points it will be reviewed in some detail

CASE 6 O L age 36 a mechanic ten days ago while at work at a machine accidentally cut the dorsum of his right index finger in the region of the proximal interphalangeal joint He continued working the succeeding two days without a protective dressing over the wound He then began to experience pain in the finger soon extending to the dorsum of the hand On the following day the patient consulted a physician who diagnosed the condition as erysipelas and treated it as such for a week No improvement followed The writer saw the patient on the tenth day of his illness Examination showed an acutely ill prostrated male adult apparently in severe pain The entire right hand forearm and arm was fully two and one half times its normal size The skin was livid in appearance most noticeable on the posterior aspect The dorsum of the hand forearm and distal half of the arm was covered with vesicles of various dimensions containing clear yellow fluid Because of the greatly thickened skin each hair follicle stood out prominently resembling the *peau d orange* appearance seen frequently in carcinoma of the breast The entire hand was sensitive to touch but there was no one point of maximum tenderness and active mobility in the fingers was fair Further examination showed a practically healed incised wound on the dorsum of the index finger The entire back of the hand and forearm was considerably tender and the induration present felt brawny No fluctuation as demonstrable Mobility at the elbow and shoulder joints was as free as the swelling would permit The temperature was 105 6 degrees F White blood corpuscles 28 000 polymorphonuclear leucocytes 88 per cent A blood culture taken at this time was reported positive for streptococcus hæmolyticus with a scant growth The patient was anæsthetized and an incision was made on the dorsum of the hand A large quantity of pus was found in the dorsal subcutaneous space The dorsal tendon sheath appeared to be uninvolved With this incision as a starting point numerous succeeding ones were made on all aspects of the forearm and outer side of the arm for drainage and counterdrainage Great quantities of pus were evacuated Large necrotic masses of fascia and subcutaneous tissues were found lying free in this sea of pus It was apparent that the entire forearm was completely encircled by pus which cultured streptococcus hæmolyticus The upper limit of the infection appeared to be at about the mid humeral region

The postoperative course of the patient was stormy On two occasions it was found necessary to

make counter incisions on the posterior surface of the arm A collect on of pus was found between the brachialis anticus and biceps muscles Practically the entire superficial fascia of the forearm and arm sloughed out in large necrotic p eces The major portion of the skin on the back of the hand became gangrenous exposing the extensor tendons In addi tion to this there developed during the third week an osteomyelitis of the shaft of the fourth meta carpal and a suppurative tenosynovitis of the ring finger flexor tendon sheath When the latter was op ned the tendons were found necrotic and were excised Blood culture on the third postoperative day revealed streptococci while all succeeding ones were negative Under Carrel Dakin treatment all the wounds rapidly became clean During the fifth week a thin shell of bone sequestrated from the dorsal surface of the fourth metacarpal bone fol lowing which the extensive wound on the dorsum of the hand began to granulate and soon covered over the exposed extensor tendons A few Thiersch grafts helped materially to hasten epidermization As soon after the original operation as the patient was physically able active motion in the hand wrist elbow and shoulder joints was instituted Massage was started after the discharge from the wounds had ceased This was supplemented by baking and me chanicotherapy at a later date Figures 17 18 19 and 0 represent the condition at the end of 11 months and demonstrate the free mobil ty in the wrist elbow and shoulder The ring finger is inactive as a result of tendon necros s Motion in the inter phalangeal joints of the other fingers is normal but there is restriction amounting to 50 per cent at the metacarpophalangeal joints presumably due to dense adhesions b tween the extensor tendons and the scar on the back of the hand In spite of thi the patient s grip is excellent and he has resumed his former occupation

From the standpoint of end results there fore these cases can be summarized as follows One patient died One recovered with restora tion of complete function The remaining 2 present fair anatomic and functional results but both patients have been able to resume their former occupations without any decrease in earning power

CONCLUSIONS

From the foregoing analysis of 460 hand in fections it would seem justifiable to draw the following conclusions

1 The vast majority of simple abscesses of the hand are as a rule easily recognized and and may be treated adequately The occasion al case of abscess over the site of a clearly de fined anatomical synovial compartment or fascial space often offers considerable difficulty in differential diagnosis Recognition of the importance of minor signs would seem to tend to overcome this difficulty

2 Localized cellulitis of the digits and hand often simulates closely the more severe in fections of the tendon sheaths or fascial spaces As conservative treatment practically always results in a cure and as unnecessary incisions usually aggravate the conditions present it becomes imperative to study most carefully the various symptoms and objective findings in each individual case so that a positive dia nosis may be arrived at

3 Isolated abscess of the web spaces is not an infrequent form of hand infection The physical signs are distinctive and to secure adequate drainage the web may be split from front to back for no untoward sequellæ fol lowed this procedure

4 The successful treatment of collar but ton abscess dep nds mainly upon the recogni tion and isolation of the tiny sinus connecting the superficial and deep pockets The latter is very often the more extensive of the two The results in this group are most satisfactory 2 out of the 42 in this series presenting slight permanent anatomical defects

5 Paronychia is probably more often uni lateral than total It is b tter apparently to treat these early infections radically than to await the more evident typical run around It is important to remember that in the ma jority of instances (28 out of 42 cases here) the subungual region adjacent to the infected paronychium is also involved requiring re moval of the side and corner of the nail to secure proper drainage The chronic cases with fungus like granulations extending from beneath the eponychium yield to the radical operation or a Bier s hyperæmia for a short while

6 Carbuncles are found on the dorsum of the hand and fingers the pathology depending upon the anatomical peculiarities of the skin in this region The successful treatment of this form of infection calls for the early recog nition of the extent of pathology present and wide radical incisions with und rmining of the skin flaps

7 Felons may be either well localized in volving only a part of the anterior closed space

or they may affect the entire space The pro portion in this series was 25 to 37 cases Di agnosis usually offers very little difficulty In the treatment the important factors are the time for incising and the anatomical po sition of the incision It would appear that the side incision offers the best chance for a symp-tomatic cure Where a discharge continues after satisfactory drainage the cause is usually to be found in an osteomyelitis of some part or whole of the distal phalanx Twenty one of a total 62 cases presented this complica tion Depending upon the extent of involve ment recovery results with conservatism in the mild cases and removal of the necrosed portion in the more extensive ones With the epiphysis untouched regeneration of at least part of the diaphysis occurs more often than is generally realized The reconstruction of deformed tender scars constitutes another phase of the later treatment

8 Chronic localized superficial infections of the hand are not uncommon While the staphylococcus aureus is the most frequently cultured organism the cause for the failure to heal is to be found locally and is as a rule thermal mechanical or chemical Removal of the cause will in the majority of cases bring about speedy recovery

9 Suppurative tenosynovitis of the flexor tendon sheaths should be considered a major surgical condition In its successful treat ment the ingenuity and patience of the sur geon are frequently taxed to the utmost When the subject is carefully analyzed it appears that until our knowledge of the anat omy physiology and pathology of the ten dons and their sheaths is more perfect the best end results can be obtained by (a) an early diagnosis made possible by proper eval uation of physical signs (b) early operation preferably during the first 24 hours (c) per forming the operation in a bloodless field with the patient under general anæsthesia (d) the use of properly placed and sufficiently long primary incisions (e) making every attempt to avoid secondary contamination and in fection during the postoperative period (f) reducing the use of drainage material to a min imum (g) the early employment of active and passive motion and later of other physio therapeutic remedies and devices and (h) maintaining an attitude of constant close at tention to details until treatment has been terminated

The possibility of extension to the various bursæ and fascial spaces must be borne in mind and when involved they also are treat ed along the same lines The immediate and late results of tenosynovitis in the last anal ysis depend upon the ultimate fate of the involved tendons Of 42 cases here reported 30 sloughed some part or the whole length of one or both tendons a percentage of 71 4 An examination of Table II shows graphically the reason for this Accepting the principles of treatment as outlined results can be im proved only by early diagnosis and operation

10 Suppurative ulnar bursitis follows either a tenosynovitis of the little finger or an ex tension from the radial bursa the latter occur ring in 33 3 per cent of the cases in this series Diagnosis is not difficult when the history and previous pathology are known and when the various objective findings are carefully eval uated The treatment calls for properly placed adequate incisions both in the hand and above the wrist and the application of the same prin ciples outlined under suppurative tenosyno vitis To secure free drainage in particularly virulent cases the anterior annular ligament may be split No untoward results followed this procedure When the infection extends beyond this sac in the hand the middle palmar space or the radial bursa or both be come infected and in the forearm the deep spaces become involved Great difficulty is experienced in attempting to analyze end results because of their direct bearing on the outcome of the infection in associated ana tomical regions

11 The observations recorded above apply equally as well to suppurative radial bursitis Radial bursitis frequently follows traumatic amputations of the thumb In making the incision every effort should be made to avoid injuring the intrinsic muscles of the thumb so that the important apposing action may be preserved It is rarely if ever necessary to split the annular ligament for the upper end of the bursa can be thoroughly drained through the external lateral incision above the wrist

TABLE I—INDICATING THE INCIDENCE OF EXTENSION OF INFECTION FROM TENOSYNOVITIS OF THE FINGERS IN THIS SERIES

Primary Infection	Thumb Cases	Index Finger Cases	Middle Finger Cases	Ring Finger Cases	Little Finger Cases
Radial bursa	4				4 (1 following ulnar bursa)
Thenar space	4	3			
Ulnar bursa	4 (1 following radial bursa)				8
Mid palmar space			3	3	2

The end results depend mainly on the outcome of associated infections

1 Thenar space infection is a most characteristic entity The predominant diagnostic feature is the excessive ballooning out of the thenar eminence Accepting the anatomical outline and limits of this space treatment consists mainly in making the incision advocated by Kanavel A complete restoration of function can be expected in every uncomplicated case

13 The diagnosis of infections of the mid palmar space should rarely offer any great difficulty The outstanding single objective finding is the replacement of the normal concavity of the palm by a convexity Bearing in mind the anatomical boundaries and position of this space the reason for forming the incision recommended becomes apparent In the great majority of uncomplicated cases there is every reason to expect an excellent end result So per cent in this series In other cases the final outcome appears to be influenced by infections present in adjacent tendon sheaths and bursæ

14 The important facts determined by an analysis of the deep tenosynovial cases were (a) that they were usually extensions from a preexisting radial or ulnar bursa infection (b) that the pus was situated deep to the flexor tendons (c) that satisfactory drainage could be obtained only by the wide incisions and (d) that the final results were generally satisfactory

TABLE II—DEMONSTRATING THE RELATIONSHIP BETWEEN ONSET OF SYMPTOMS AND OPERATION AND SUBSEQUENT TENDON NECROSIS OR RECOVERY IT EMPHASIZES THE NECESSITY OF EARLY DIAGNOSIS AND OPERATION

Time from Onset of Symptoms to Operation	Number of Cases	Number in which Sloughing of Tendons Was Found	Extension to Deep Tendon Sheath Shown by X-ray	Number of Cases Healed	Number of Cases Healed by Fibrous Ankylosis	Number of Cases Healed by Bone Ankylosis
Within 12 hours	3	0	0	3	1 (dbl)	0
12 to 24 hours	7	1	3	4	2	1
24 to 48 hours	11	7	7	0	3 (1 through sinus)	7
48 to 72 hours	17	17	17	0	0	7
After 72 hours	5	5	4	0	0	5

TABLE III—INDICATING THE PATHS OF EXTENSION FROM RADIAL AND ULNAR BURSITIS IT SHOULD BE UNDERSTOOD THAT THE SAME CASE MAY HAVE SIMULTANEOUS INVOLVEMENT OF TWO OR MORE OF THE SYNOVIAL SHEATHS OR FASCIAL SPACES

	Ulnar Bursa Cases	Radial Bursa Cases
Ulnar bursa	0	4
Radial bursa	4	
Mid palmar space	1	
Thenar space		4
Deep palmar arch	5	4

15 Suppurative tenosynovitis of the common extensor tendon sheath is an uncommon condition While not pathognomonic the outstanding signs and symptoms are inability to flex the fingers and the absence of positive tenderness on the anterior aspect of the hand Simple splinting of the hand seems to me the basis of treatment It is interesting to note that

necrosis of the extensor tendons occurs rarely The number of good late results is thereby greatly increased

16 Osteomyelitis of the proximal or middle phalanges usually follows incompletely drained flexor tenosynovitis The proximal interphalangeal joint is very often also involved The course of treatment followed will depend upon the extent of the disease various cosmetic and economic factors and the progress of associated infections and will range from simple conservatism to amputation

17 Infection of the palmar fascia is a rare condition evidencing definite pathological findings and caused usually by the staphylococcus aureus Treatment is simple and consists of incision with removal of the necrosed fascia The results are good

18 Phlegmonous lymphangitis is a severe lymphatic infection on the dorsum of the hand forearm and often the arm accompanied by necrosis of the subcutaneous tissues superficial fascia and sometimes large areas of skin Marked systemic symptoms manifest themselves and are often severe enough to overwhelm the patient Adequate drainage through multiple incisions maintenance of the fluid level of the body the use of the Carrel Dakin technique and transfusions are the main factors in treatment

19 The intelligent treatment of hand infections demands a knowledge of the anatomy of the hand and the various pathological processes that may exist Every effort should be made to obtain the best result possible for the hand from the economic social and cosmetic standpoints is one of the most important organs of the human body

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VASCULAR TUMORS OF THE INTESTINE[1]

By ALFRED J BROWN MD FACS Omaha Nebraska

BENIGN tumors of the intestinal tract are of comparatively rare occurrence and of the various forms of benign tumor a vascular tumor is one of the least frequently encountered Reported cases are few and far between antemortem diagnosis is unusual and exact preoperative diagnosis except in those cases in which the growth involves the rectum and is visible is unknown

CASE REPORT

The patient a girl of 12 years of age was referred to me by Drs Sandusky and Lee of Seward Nebraska She had been well up to the onset of the present trouble except for an occasional intestinal upset during the past few months At these time she said she had some abdominal distress but did not vomit or have any other symptoms The attacks were so slight that the mother thought nothing of them On the day of admission about half an hour after a heavy noon-day meal she complained of sudden sharp pain in the abdomen and vomited The pain was cramp like in character and situated low in the abdomen and the vomiting continued At first the vomitus consisted of stomach contents and in the course of a very few hours it became stercoraceous The following morning the child looked very sick Constipation had been absolute after a first small movement following an enema and the vomiting was continuous every few moments Her face was drawn and pinched The abdomen was moderately distended but no visible peristalsis could be seen The muscles were soft except for slight rigidity of the lowermost portions of the recti No tumor mass could be felt by abdominal palpation Rectal examination revealed a doughy feel to the finger so much so that she was catheterized in spite of the fact that she had voided a short time previously but only a small amount of urine was obtained The leucocyte count was just over 25 000 and the polymorphonuclear cells over 80 per cent From subsequent knowledge this was evidently a dehydration leucocytosis The temperature was 99 degrees with pulse of 120 and respiration slightly increased

From the examination and findings a diagnosis of either fulminating appendicitis or intestinal obstruction was made and immediate operation advised Under ether anæsthesia a rather long incision was made just to the right of the mid line of the abdomen having the umbilicus as its center The small

[1] Read before the Western Surgical Association December 7 1923

intestine was ballooned up to about four times its nat ural size and its wall markedly thinned The pelvis and lower abdomen contained a considerable quan tity of serosanguinous fluid and lying deep in the pelvis was a tumor that felt l ke the proverbial bag of worms spoken of so often in describing varicocele When this was delivered from the abdominal wound it was found to be in the small intestine The exact location with reference to the duodenum was not noted as I d d not want to lose any time but from the character of the symptoms the undigested con tent of the bowel just above the site of constriction and the small amount of distention showing from without compared with the very great distention of the intestine above the constriction found after open ing the abdomen I would judge it was rather high in the jejunum Eight inches of gut containing the tumor was resected and an end to end anastomosis performed Following operat on acute gastric d la tation supervened vomiting continued and death occurred 2 days later An autopsy was refused

The tumor was 5 inches in length annular in form and involved the entire circumference of the intes tine Its longest measurement was at the junction of the mesentery with the gut though the mesenteric vessels were not involved From this broad area its margin passed diagonally across the gut on e ther side until at the area of gut opposite the mesenteric border it was only an inch in length and here the dilated veins of wh ch it was made up v ere small r than near the mesentery The dilated blood spaces of which the tumor was composed were raised from the surface of the gut and were of a dusky violet color The margins were rather sharply demarcated and raised above the surface In the original state with the sinuses engorged with blood this elevation amounted to a quarter of an inch at the margin of the tumor and half an inch at its thickest part Near the periphery of the gut opposite the mesenteric bor der were three phleboliths The finger introduced into the lumen of the gut met a constrict on which would not admit the t p of the finger and the intes tine above this const iction contained almo t en tirely und gested food When the gut was split long tudinally the constrict on was found to be due to a collection of fibrous tissue around the dilated s nuses at the th ckest portion of the tumor Toward the periphery the d l ted sinuses could be seen be neath the mucosa and the mucosa was elevated but was otherwis normal On section the tumor con sisted of irregular sinuses lined with endothel al cell and containing large numbers of red blood cells The greater number were situated in the submucosa and the mucosa was nowhere involved In some reas the sinuses had insinuated themselves between the muscle bundles and some appeared beneath the serosa Histolog cally the tumor was a cavernous hæmangioma

Rokitansky (22) mentions a blood vascular new growth of the intestine but his ide evidently not clear cut on the subject

English translation of his work published in 1855 he mentions vascular tumors in connec tion with both stomach and intestine Re garding the stomach he writes Erectile tissue is either developed in the free end of polypi or the mucous membrane degenerates into it on a larger surface upon which the erectile tumor is attached by a broad base or only by a very short neck or stalk It is the common seat of encephaloid infiltration Un der tumors of the intestine he states Erec tile tissue occurs as a pediculated polypus (mucous or cellular polypus) or in the shape of large broad sessile tumors chiefly as the consequence of catarrh in the colon and rec tum It may in this case also be the seat of medullary carcinomatous infiltration Roki tansky appears to consider the tumors as the result of inflammation and as prodromata of malignancy Six years later (23) in discussing the subject he does not mention vascular tu mors of the stomach and under the heading intestine states that vascular tumors are of the greatest rarity (Hoechst seltenen Faellen) and when found consi t of telangi ectases of the intestinal mucous membrane

Longuet (16) in 1898 cites three ca es and notes the rarity of the occurrence of angiomata of the intestine and considers one of the three cases he tabulates not an authentic case He fails to include Gascoyen s (8) case which is the first one reported

Heurtaux (12) in 1900 calls attention to the rarity of the condition and abstracts the three cases already cited by Longuet

MacCallum (17) in 1906 reviews five cases and adds a sixth from the Johns Hopkins Hospital Pathological Department

Dewis (6) 1906 in a review of benign intes tinal tumors call attention to the rarity of angiomata and states that he h as been able to find reports of only three cases He adds no new cases

King (14) in 1917 notes the rarity of angi oma of the bowel and states he could find im perfect records of but 3 cases A fourth case referred to by Louenstein as a case of Nicoll s could not be found King calls attention to the fact that Longuet considers one of the [illegible] Heurtaux table is given and [illegible] Gascoyen s case

Judd and Rankin (13) in 1921 confine their paper to vascular tumors of the stomach and duodenum and report an angioma of the duodenum

Helvestine (11) in 1923 reports 14 cases collected from the literature and adds another found at autopsy He classifies the tumors as either simple or cavernous angiomata and states that the growth may begin either in the subserous intramuscular or submucous plexuses of the intestinal walls the submucous plexus being the most common site of origin

In a rather careful search I have been able to find but 19 cases of vascular tumor of the intestinal tract below the stomach These include all forms of vascular tumor varying from capillary nævi to cavernous angioma Brief abstracts of the cases are given

CASE 1 Gascoyen (8) The patient a man of 44 died as the result of a nævus involving the parotid gland which caused death from suffocation There were numerous other nævi over the body and limbs forming tumors of greater or less size There were also nævi of the viscera In the case of the small intestine having a nævus visible beneath its peritoneal coat the growth had originated in the submucous cellular tissue and projected considerably into the cavity of the bowel but the mucous membrane covering was still entire

CASE 2 Laboulbene (15) The patient a man of 64 suffered from an attack of blood in the stool One month later he again passed blood in the stool and also vomited black clotted blood The hæmorrhage recurred a few days later and the patient died Postmortem revealed an elevated tumor about the size of an almond in the duodenum above the papilla of Vater The mucosa was the site of a ragged ulcer which exposed the tumor On section it was found to be made up of dilated capillary spaces

CASE 3 Boyer (4) Male aged 62 died of pneumonia Paralysis on right side for 3 years No intestinal symptoms About six feet of the free border of the lower jejunum and upper ileum showed small rounded dark spots visible when the gut was held up to the light These were attached to the vascular arterial arcades of the gut They were very numerous probably 50 on 20 centimeters of the surface of the gut The tumors are attached to the arteries and appear like injected renal glomeruli They were continuous with the arteries and each had an imperfect elastic fibrous envelop

CASE 4 (Paci 21 quoted by MacCallum) A woman after suffering from symptoms of intestinal obstruction passed a cavernous tumor which had been the site of a hæmorrhage into its substance and its pedicle had parted allowing it to be passed The central portion of the tumor was composed of cavernous tissue Recovery took place

CASE 5 Marsh (18) reports a case of a girl aged 10 who since 2 years of age had suffered from continuous and sometimes severe intestinal hæmorrhages A nævoid growth was seen by speculum in the lower rectum completely surrounding the gut Paquelin cautery relieved but did not cure the condition

CASE 6 Barker E T (1) describes a case of nævus of the rectum in an adult The patient a healthy man developed diarrhœa and hæmorrhage The mucous membrane of the rectum was blue and ulcers developed which bled freely The bleeding continued a stricture formed and the patient died of anæmia Postmortem The lower four and one half inches of the rectum was thickened by a nævoid growth in its walls and on the rugæ were the three shallow ulcers described

CASE 7 Delbet (5) The patient was a woman 21 years of age who gave a history of long continued intestinal disturbance She was emaciated the abdomen large and there was marked visible peristalsis and signs of ascites The chronic intestinal obstruction grew worse At operation no free fluid was found The small intestine was markedly distended down to the site of a growth which surrounded the intestine like a ferrule and protruded 3 centimeters above the surface Resection was performed and the tumor was found to be an angioma The caliber of the gut was so reduced that it hardly admitted the tip of the finger The patient died following the operation

CASE 8 Nicoll James H (19) The patient was a woman of 23 years who suffered from pain hiccough eructations persistent vomiting and absolute constipation A fortnight previously she had had a similar but slighter attack and during the fortnight had had pain in the epigastrium coming on shortly after meals and lasting for an hour At operation a double intussusception was found About five feet of intestine was resected and in the gut just above the intussusception was a tumor about the size of a pigeon's egg An end to end anastomosis was performed and the patient recovered Histological report There are large thin walled spaces filled with coagulated blood and the tumor is typically nævoid It contains two small phleboliths each the size of a split pea Its size is that of a pigeon's egg One surface is covered with peritoneum and the other the internal with villous mucous membrane

CASE 9 Hektoen L (10) Male 48 years died of chronic aortitis and mitral endocarditis The upper third of the small intestine shows many large vessels running under the mucous coat transversely to the long axis of the gut and parallel one to the other giving the mucous membrane the appearance of being the site of varicose veins Smaller vessels present numerous nodular enlargements all of which are full of blood and project beneath the mucosa The mucous membrane is normal There are no

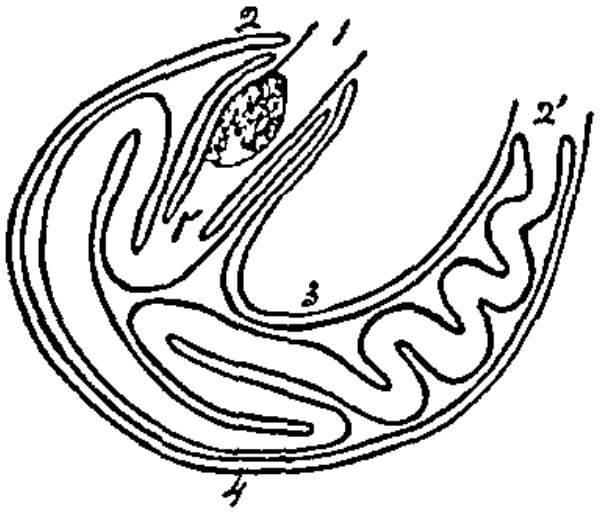


Fig. Vascular tumor causing double intussusception. Diagram of section of gut. C. e. B. N. coli.

changes in the veins of the mesentery or other parts of the abdominal viscera. Microscopic examination shows the tumor to be composed of abnormally numerous and abnormally enlarged veins with saccular and globular dilatations.

CASE 10. MacCallum, W. G. (17). The patient was a white male, aged 54 years, who complained of digestive disturbances for months. Two years before he had vomited blood. He was alcoholic. There were small firm purplish nodules throughout the small intestine, best seen by transmitted light. *They were scattered along the veins and connected* by abundant branches with the larger veins. Sections show these nodules to be vascular tumors of cavernous structure, composed of wide sinus-like spaces lined by endothelium and full of blood. They lie in the submucosa, not invading the mucosa and in but few places found in the musculature.

CASE 11. Benneke, H. (2). The patient, a man of 52 years, died of tuberculous meningitis. In the *submucosa of the entire gut from œsophagus to rectum* were many small brownish red masses. There were also masses on the under lip. There were no hæmorrhoids.

CASE 12. Ohkubo, cited by Helvestine (20). The patient, a woman, 62 years of age, died of pneumonia. At autopsy there were found many varices in the submucosa of the jejunum.

CASE 13. Ohkubo, cited by Helvestine (20). The patient, a man of 79 years of age, died of pneumonia. At autopsy there were many small nodules of a red color in the submucosa of the small intestine. They projected into the lumen of the gut, but the mucosa over them was unchanged. Microscopically they were cavernous angiomata.

CASE 14. Tuffier (24). The patient, a man of 37, had had intestinal hæmorrhages since the age of 7 years. He passed about a tumbler of bright red blood at a time. After each attack rest in bed relieved him temporarily. Tuffier found by sigmoidoscopic examination a small purplish lump the size of a pea, 22 centimeters above the anus. The surface was ulcerated. It was cauterized and the patient improved for a time. Then the hæmorrhages recurred. Abdominal operation revealed no mass. At autopsy two small angiomata were found in the sigmoid. They were in the submucosa and the mucosa over them was normal.

CASE 15. Hartmann (9). The patient, a woman of 22 years of age, was thought to have hæmorrhoids. Hartmann found a small angioma which was accessible by proctoscopic examination. *Electric cauterization* cured the condition.

CASE 16. Dujarier and Topous Khan (7). The patient, a man, had been suffering from occasional rectal hæmorrhages for 3 years. Abdominal operation showed numerous cavernous angiomata of the sigmoid and marked varicosities of the veins.

CASE 1. Judd and Rankin (13). The patient, a woman of 22 years of age, had suffered from nausea *and epigastric distress for years. The attacks were* brought on by dietary indiscretion. The occurred about two hours after meals and were relieved by vomiting. The X-ray showed a shadow which appeared as a ring with translucent center. Operation showed a thick-walled dilated stomach. On the duodenal side of the pylorus was a rounded tumor filling the duodenum. The tumor was enucleated by an incision in the mucous membrane. Histologically the tumor consisted of a mesh of fine capillaries with a few dilated sinuses supported in a highly cellular framework. The growth was apparently a rapid and recent process.

CASE 18. Helvestine (11). The patient, a female mulatto aged 72, died apparently of a terminal pneumonia. There is a pedunculated tumor on the external surface of the jejunum, 27 centimeters from the pylorus. Neither the peritoneum nor mucosa are involved. It is definitely encapsulated and consists of a central spongy mass and a cystic cavity containing a brownish fluid and a small amount of grumous material. Histologically there were large *endothelial lined spaces containing erythroblasts*. The blood spaces were separated from each other by a dense connective tissue stroma. Helvestine considers the tumor a cavernous hæmangioma which is undergoing retrogression.

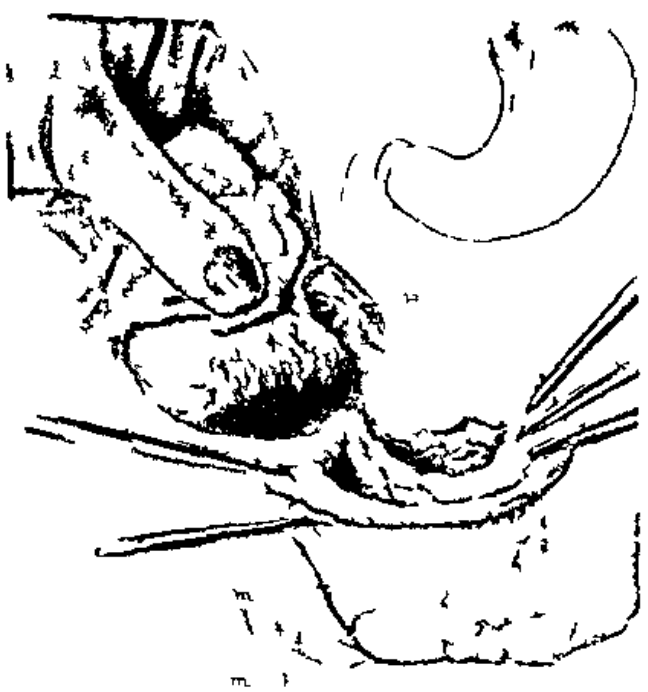
CASE 19. Bland, M. F., Mashke, A. S., and Karsner, H. T. (3). The patient was a girl 10 months of age who had persistent and continuous vomiting for 4 days. There was fæcaloid vomiting and absence of stool. *On examination abdominal distention* prominent abdominal veins and visible peristalsis were noted. At operation a tumor was found in the ileum about 8 centimeters from the ileocæcal valve. An ileostomy was performed but death occurred the following day. At autopsy a tumor was found 30 centimeters from the ileocæcal valve. The diameter of the gut at the tumor area was 3 millimeters. Microscopically the tumor was found *in the mesentery and all walls of the intestine except* the mucosa. The tumor was arranged in lobules. Its cells were large and round, oval or spindle



F 2 A mata tt red alo g blood s el \ e ed by tran mitted l ht (Ca e o M Call m *J l H p k s Ho p B lt*)

arranged to form capillaries The capillaries were clo ely oppose l and formed irregular whirls through the lobules The cells were of endothelial character Certain lobul s showed few or no capillaries The tumor was obviously a capillary hæmangioma The authors classify it as hæmangio endothelioma and group it with the intravascular or simplex class rather than with the perithelioma ta

A study of the twenty cases collected reveals the following



Fg 3 Dra m h wing the m thod f m l f g ma f d od um (C se J dd a d Ra k 4 S g)



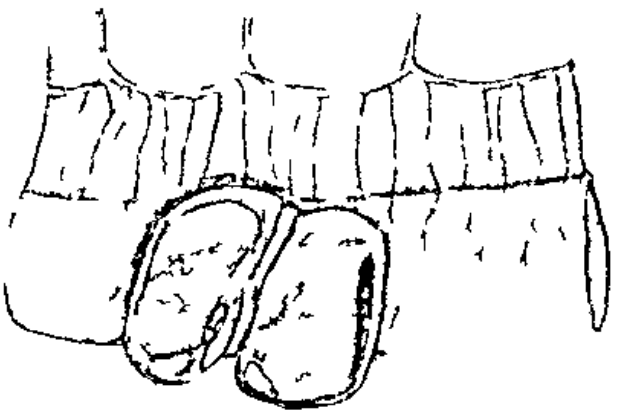
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Sex Classification as to sex shows the cases to be evenly divided 10 being in males and 10 in females Considering the symptoms with the sex shows that of the 7 ca es in which there were no symptoms 5 were in males and 2 in females It is interesting to note that all the cases showing intestinal obstruction 5 in number were female patients while five of the 6 patients exhibiting hemorrhage as the prominent symptom were males

Age The age of the patients varied from two months to 79 years Those giving symptoms during life varied from two months to 64 years

Number of tumors In 1 cases the tumor was single in 8 there were multiple tumors the number varying from two to hundreds

Part of intestine involved In 2 cases the tumor was in the duodenum In 11 the small



F 5 D a h p e ting hæmangi ma of th d o- d n m h hha bee t ed to h w the t 1 (C se S H l est f *S g*)

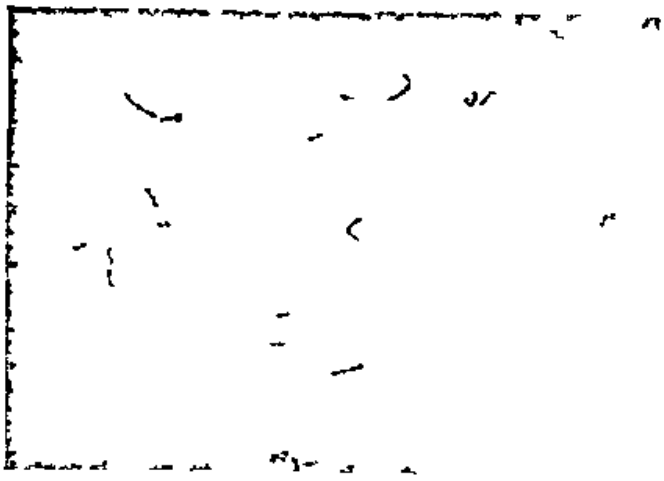


Fig 6 Microscopic section of fibromyoma of jejunum (Case 8 Harvard Medical Service *Ann Surg*)



Fig 7 Photomicrograph of papillary tumor of ileum (Case 9 Blood Hospital Karsner *Am J Path Child*)

intestine was the site of the growth In 3 cases the sigmoid was involved and in 2 of these the growth was multiple In 2 cases the tumor was in the rectum In one patient the entire intestinal tract and even the lower lip was involved In one case that in which the tumor passed spontaneously the site was unknown

Gross character of tumor Five of the tumors were diffuse 7 were encapsulated and in 8 cases no statement as to this characteristic was reported In 3 cases there was ulceration of the mucous membrane over the surface of the tumor In the remaining 17 cases the mucosa appeared normal even though in 3 of these hæmorrhage had been a symptom

Symptoms Seven of the cases gave no symptoms Of the remaining 13 6 suffered from gastric or intestinal hæmorrhage one from nausea and epigastric distress with vomiting after eating (evidently very early high partial obstruction) one from chronic intestinal obstruction 4 from acute intestinal obstruction and in one case the symptoms were not given Of the acutely obstructed cases one was relieved by the spontaneous passage of the tumor in one the tumor caused an intussusception and in the other 2 the tumor itself caused obstruction by constricting the lumen of the gut

Part of wall giving rise to the tumor In all cases in which any statement was made the tumor arose in the submucosa From this point it tended to invade the muscular coat even to a point beneath the peritoneum The peritoneal coat in all cases remained intact In 3 cases the mucous membrane was ulcerated but the mucous coat was apparently not involved by the tumor itself In one case only did the tumor invade the mesentery

Histology The histological reports though not detailed in all cases would tend to show



Fig 8 External surface of fibromyoma of small intestine



Fig 9 External surface of fibromyoma of small intest



Fig 10 Intestinal portion of mesentery and flattened out to show the tumor on the external surface of the gut

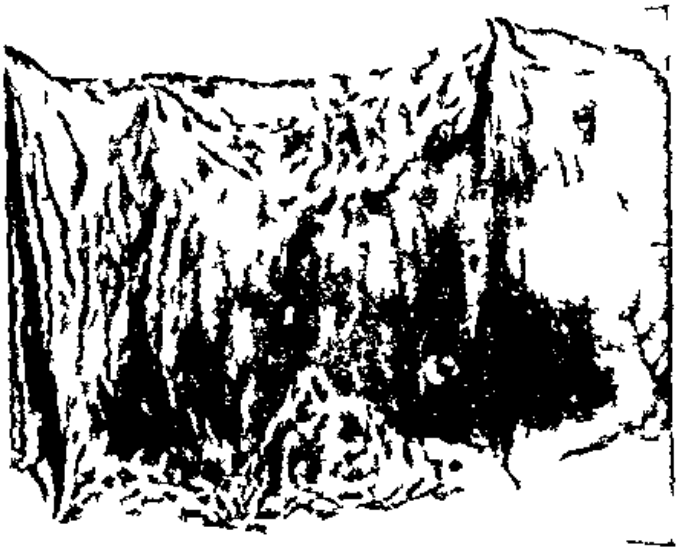


Fig 11 Intestinal portion showing mucous surface Note the constriction caused by the thickening of the tumor at its center

that the tumors range from capillary nævi to cavernous angiomata

In general from a study of these cases vascular tumors of the intestine may be grouped into four classes

1 The multiple tumor on the vascular arcades These appear as small red nodules situated in the submucosa and connected with either the arteries or veins of that portion of the intestinal wall They are best seen by transmitted light when they appear as above noted Microscopically they are either nævi or cavernous angiomata MacCallum's patient had suffered from vomiting of blood on two occasions It would appear to be a difficult matter however to attack tumors of this character surgically with any hope of relieving the patient They are very numerous in the cases reported and the site of hæmorrhage would be almost impossible to find

The submucous tumor which grows toward the lumen of the gut and may ulcerate the overlying mucosa by pressure and trauma The 3 cases of this type were all fatal In one an operation was performed and the tumor not found as it was situated in the jejunum In one the tumor was a single nodule in the duodenum above the papilla of Vater with a ragged ulcer on its surface which might have been reached and removed by operation It would appear that the possibility of the existence of this form of tumor might well be borne in mind when seeking the cause of obscure intestinal hæmorrhage

3 The submucosal tumor which may grow to such a size that it either obstructs the lumen of the gut or causes a change in normal peristalsis and brings about intussusception This type of tumor has been successfully dealt with surgically in two instances In a third case the tumor was spontaneously evacuated with recovery The possibility of the presence of this type of growth might well be remembered when seeking the cause of intestinal obstruction

4 The diffuse ring like tumor which beginning in the submucosa involves the muscu

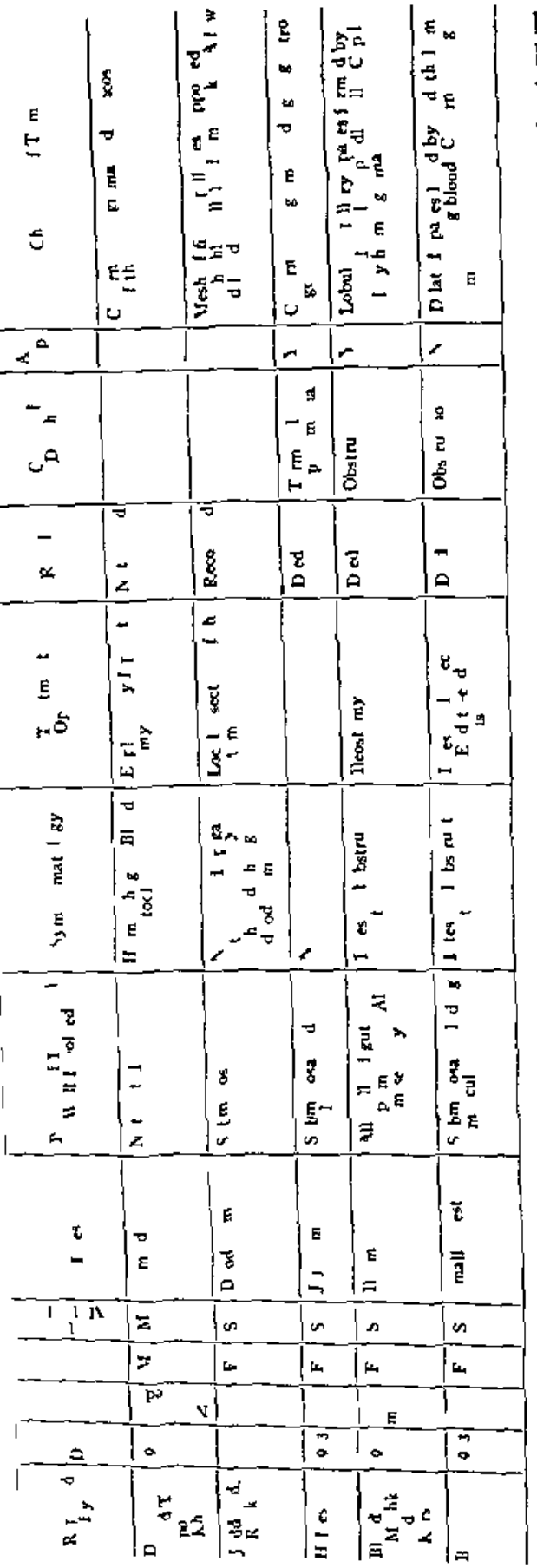


Fig 12 Photomicrograph of cavernous hæmangioma of the small intestine

SUMMARY OF CASES THUS FAR REPORTED

Reporter By	Date	Age	Sex	Color	Symptomatology	Treatment Operation	Result	Complete Death	Autopsy	Characteristic Tumor
G y	6		M	S	m ll es	lm osa d m l projec g) m) lo]	\	l l	ff k f m l ro] \ u	Yes	\ vus—vi ll t en h per l ust Or na i l m cosa— P c t h lo l M cosa no d
L o Jr	8	6	M	S	Duod m ho T f lla f \	S bm osa h l ra io l mucosa	H mo h l lood ool repe ed		l ed	ll mor ha	\	I l d pillary paces Ra ged l l mucosa.
l y	8	6	1	M	Lo]] m d ff le m	S l m osa A ached sc f trades	\ ne		l ed	P eume ia	Yes	A ache l ar eries my fectly en l la ed Luk nal gl merula. A y mal va ?
Pac	8	2 /	F		\ k	bmucosa	I es al l ru io		Rec ed. ta ou ac ia lon			C nou t m Ped ncula ed Il morrh g bs nc
1 h	8 8		F	S	Rec m	S l muc sa	H mo h ve Blood ool	C y	R l f			\ vo l gr wth my l ly surrou l l g h gut
B k	898		M	S	Rec m Lo nches	S bmucosa le ed	H mc h g Blood l		l ed	A emia	Yes	Sev l w h in w as f rec m. Th re hallow lc rs ruge re
Bell	8		F	S	m ll un es	S bmucosa d m la	I es l l ruct hro	I es nal esec io l d na m	l ed	Ot roc es		A la gi ma h rc re f bo l
N ll	80	3	F		m ll tes	l m sa	I es l bstru k ac l s. l io	I es l l esec d e d na o- mos	Rec ed			La h lled pores f ll d so h gula ed l lood I mo defi ly l l hl l l tha Doul l ssause l son
Il ue	900	8	1	1	m ll es ne pl f	l m osa	\ ne		l ed	Chro ac d ml tral en l l	Yes	Abnormall rre ou d bnor mally enla ge l h saccula d k bowe d lata m
MacCal l m			M	M	Small es	m osa d m sc la	Hæm rrha \ m d blood Lo g d ges d banc lc hol pa se		l ed	A k sel ros Broncho Pneumo ia	Yes	Vasc la Of ern ru l m l sed f id ik ps es l ed h d h l m d f ll f l lood
B	906	5	1	M	E	S l m soc	\ ne		l ed	T berculou m gi	Yes	C mou l hlebect es.
Ohl b	7		F	M	f	S l m osa	\		l ed	I mo ia	\	\ lces
hk b			M	1	m ll es	l m osa	N		I d	Phe mona	Yes	C l m
T ffs			1	M	m l	bmucosa le ed	H morrh Blood ool	E pl ra ey l pseu m \ ga fi d ga	D ed	\	\	A oma
H ma			F	S	Rec m	\ d	N d Thou ht h mo h ll	Flec ic rus k	Reco d			A oma

SUMMARY OF CASES—Continued



larts and constricts the lumen of the gut bringing about an intestinal obstruction which may manifest itself either by a gradually increasing chronic obstruction or by an acute obstruction with sudden onset

In only one case (that of Gascoyen) is there a suspicion that the tumor is more than a simple angioma In this case there is the possibility that the intestinal tumor was a metastasis from the original parotid tumor This is made more reasonable by the fact that there were similar tumors in other organs In the remainder of the cases the tumor or tumors were localized in the intestinal tract and no cases of metastasis were reported No case of recurrence after operative removal has been reported

It seems hardly possible that angioma of the intestine is of as infrequent occurrence as the literature would seem to indicate and I would greatly appreciate the receipt of complete clinical reports of cases of this character accompanied by microscopic slides if possible in order that the reported cases may be amplified and further study uncover more facts concerning the condition

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PRE-OPERATIVE PREPARATION OF PATIENTS WITH OBSTRUCTIVE JAUNDICE

An Experimental Study of the Toxicity of Intravenous Calcium Chloride Used in the Preparation of Patients

By WALTMAN WALTERS M D Division of Surgery Mayo Clinic and JOHN P BOWLER M D Rochester Minnesota

From the Surgery Section of the Mayo Foundation

DURING the last 2 years in the Mayo Clinic the intravenous administration of calcium chloride has become established as a routine step in the pre operative preparation of patients with obstructive jaundice That it is a factor in the reduction of the surgical mortality in this group of cases has been shown by one of us (Walters) in a report of the operative mortality for 1922

The possible occurrence of toxic nephritis in the course of obstructive jaundice is generally accepted The incidence of renal and hepatic insufficiency in these cases at the Mayo Clinic has been reported The two may be easily differentiated the renal insufficiency being associated with cessation of the drainage of bile with evidence in the urine of a progressing nephritis and with a steady rise of the blood urea level This renal complication in postoperative convalescence has occurred in cases with and without a preoperative course of intravenous calcium chloride Renal insufficiency following the intravenous administration of calcium chloride naturally gave rise to the question of its toxicity In this study we attempt to include or exclude intravenous calcium chloride as a factor in the production of such nephritis

OUTLINE OF EXPERIMENTS

In the routine pre operative preparation of patients with obstructive jaundice a 10 per cent aqueous solution of calcium chloride is given intravenously daily for three successive days at the rate of 5 cubic centimeters for each 60 kilograms of body weight to patients within the normal range of adult body weight Such a series of injections has been called a therapeutic course and this term will be used in this sense throughout the present discussion Reducing this dosage to 1 unit for each kilogram of body weight 8 milligrams of calcium chloride for each kilogram was administered to the dogs used in the study All necessary surgical procedures on the animals were carried out under ether anesthesia and with the employment of sterile technique The various steps of our investigation were as follows (1) the rate of excretion of calcium chloride from the blood stream after its intravenous injection in various amounts (2) the lethal dose of calcium chloride injected intravenously into normal and jaundiced dogs (3) the effect on the kidneys of normal and jaundiced dogs of intravenous injection of calcium chloride and (4) the effect on the hearts of normal and jaundiced dogs of intravenous injections of calcium chloride

RATE OF EXCRETION OF CALCIUM CHLORIDE FROM THE BLOOD STREAM

The rate of excretion of calcium chloride from the blood stream after its intravenous injection in various amounts in normal and jaundiced dogs when injected in 10 per cent solution is dependent on the amount of solution injected Following small doses of calcium chloride such as the therapeutic dose (8 25 milligrams for each kilogram of body weight) it was observed that elimination from the blood stream occurs in from one half to one hour From 5 to 6 minutes after the injection the blood calcium content in the normal unjaundiced dog was elevated 1 to 2 5 milligrams for each 100 cubic centimeters After the same interval the elevation in jaundiced dogs was from 0 to 1 milligram (Fig 1)

Following the injection of larger doses such as ten times the therapeutic dose (82 5 milligrams for each kilogram of body weight)

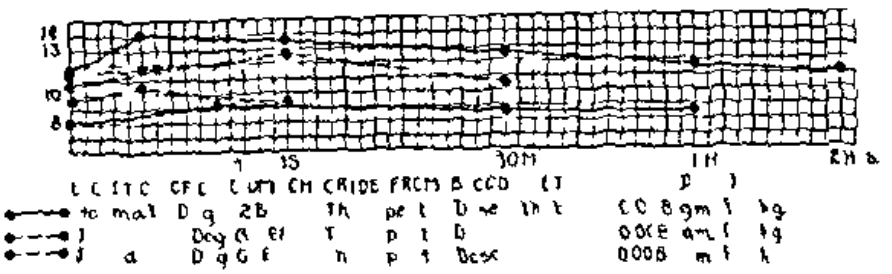


Fig Showing the curve of retention from the blood of the peritoneal dose of calcium chloride

complete elimination from the blood stream occurs within approximately 4 hours Five minutes after such an injection the blood calcium content in normal dogs is elevated 14 milligrams for each 100 cubic centimeters in jaundiced dogs 7 2 milligrams (Fig 2) The latter observation is of considerable interest and lends itself to conjecture as to the ultimate fate of calcium injected into an animal with obstructive jaundice

THE LETHAL DOSE OF CALCIUM CHLORIDE INJECTED INTO DOGS INTRAVENOUSLY

In spite of the many indications for the use of calcium little exact information could be found in the literature on its pharmacological action when administered in doses sufficiently large to produce deleterious effects Joseph and Meltzer have found 0 444 gram for each kilogram of body weight to be the lethal dose of calcium chloride injected intravenously in a solution in which the crystalline salt is in molecular solution so that 4 cubic centimeters contain 0 444 gram This solution was injected at the rate of 1 cubic centimeter a minute

We have endeavored to determine the lethal dose of calcium chloride injected intravenously into normal and jaundiced dogs at the rate of 1 cubic centimeter a minute An aqueous 10 per cent solution of calcium chloride was used (Table I)

It requires approximately twice the amount of injected calcium to raise the blood calcium content of the jaundiced dog to the same level as that of the normal dog this *in spite of the fact that* the blood calcium content is practically the same in the jaundiced and normal dogs before and after injection of a lethal dose which suggests a calcium deficiency in the jaundiced animals which is not apparent

TABLE I—SUMMARY OF RESULTS OF LETHAL INJECTION OF CALCIUM CHLORIDE

	Wt kg	Lethal dose mg per kg	Times h per c	Blood Before t	Blood After death	Mg per cent increase blood calcium
Normal Dogs	6		7 7	5	6	0
	5	7 8	3 8		8	8 8
Jaundiced Dogs	6		8		8	8 3
	6	7	8		8 7	6 7

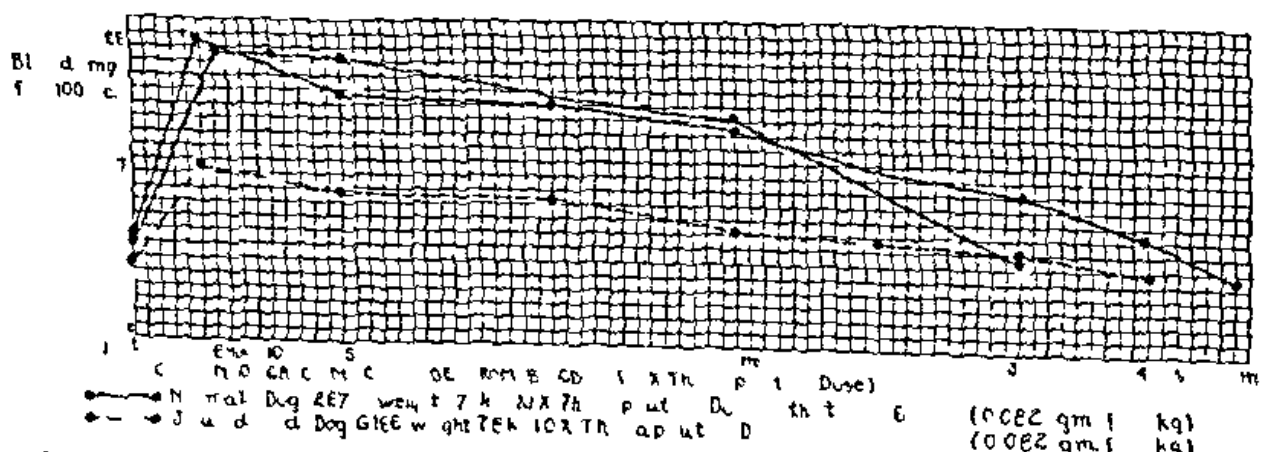


Fig Shown the curve of recovery from the blood of ten times the therapeutic dose of intravenous calcium chloride

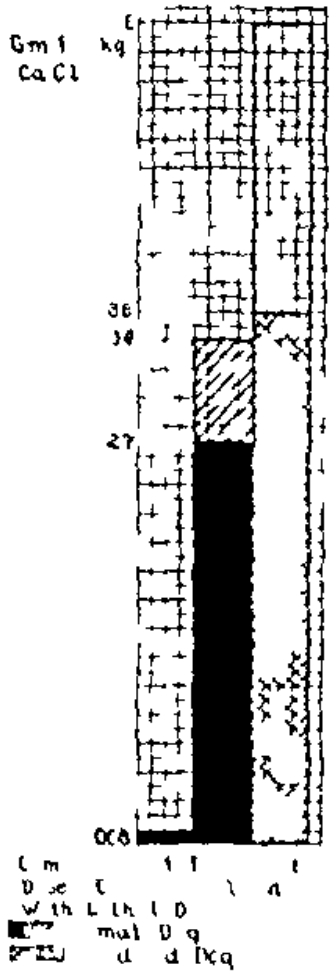


Fig. 3.—Comparison of the proportions of the lethal dose of calcium chloride and the lethal dose of sodium chloride.

The results from our experiments of the lethal dose of calcium chloride show the amount to be considerably less than that reported by Joseph and Meltzer. Carrying out a technique of constant injection at the rate of 1 cubic centimeter a minute we found the average lethal dose in normal dogs to be 396.4 milligrams for each kilogram of body weight. In jaundiced animals 386.6 milligrams for each kilogram of body weight was the amount necessary to cause death (Fig. 3).

Necropsies were performed on the animals immediately after death. Sections were taken from the heart, liver and kidneys.

THE EFFECT ON THE KIDNEYS OF NORMAL AND JAUNDICED DOGS OF INTRAVENOUS INJECTIONS OF CALCIUM CHLORIDE

Although not directly connected with the purpose of our experiments a few of the many recent reports in the literature of investigation of the diuretic action of calcium are mentioned. MacCallum asserted that the quantity of urine secreted might for a time be markedly diminished and in some cases almost entirely inhibited by the introduction of calcium chloride into the circulation. There is no evidence of such suppression with the doses or concentration of calcium salt used in the experiments of Mendel and Benedict or in our own which agrees with the work of Porges and Pribram who conclude that the suppression of urine can be accomplished only by large doses of calcium chloride inducing a simultaneous fall in the blood pressure when the salt is introduced in concentrations which leave the latter unaffected. Calcium chloride exhibits a diuretic action. The latter effect has been investigated recently and confirmed by Blum, Aubel and Hirschfelder, Barrier and Rockwood, Levy and many others. Lowenberg by ascertaining the doses necessary for the diuretic and the cardiotonic action of calcium chloride has shown that the diuresis produced by calcium is not a result of its cardiotonic action. He found that doses of 0.1 to 1 gram have a manifest cardiotonic action while its diuretic properties are exhibited only by doses greater than 1.5 grams.

In none of these discussions has a possible effect on the kidney been suggested. The fact remains however that in certain conditions such as bichloride of mercury poisoning and terminal pyelonephritis calcium deposits have been found in the glomeruli and tubules of the kidney.

Six dogs were used in the experiment three jaundiced as a result of ligation and section of the common duct and three normal. The urine was examined daily before and after the injection of various amounts of 10 per cent calcium chloride intravenously. Blood urea estimations were made at various periods before and after injections of the calcium. From these animals and from all animals killed in the course of these experiments the kidneys were removed at necropsy sectioned and examined microscopically. We have been unable to produce deposits of calcium in the kidneys of dogs by doses ranging from 8 milligrams for each kilogram of body

weight to the lethal dose of 280 milligrams to 380 milligrams for each kilogram

It was not possible to demonstrate a deleterious effect clinically or pathologically on the kidneys of these dogs following intravenous injections of calcium chloride in amounts varying from 8 milligrams for each kilogram of body weight to the lethal doses

THE EFFECT ON THE HEARTS OF NORMAL AND JAUNDICED DOGS OF INTRAVENOUS INJECTIONS OF CALCIUM CHLORIDE

The cardiotonic action of calcium administered intravenously has been mentioned in its possible relationship to the diuresis following calcium administration in which it would seem to play no part In administering calcium intravenously to patients one is impressed with the usual quickening of the pulse rate and the sensation of flushing of heat over the entire body These are temporary effects to which Hirschsohn and Maendl give the name of dynamic effect of intravenous administration The same phenomenon was observed by them following the injection of quinine dextrose hexamethylenetetramin and urea

Dixon says that when the calcium salts are injected directly into the circulation the heart beats more vigorously the vessels constrict and the blood pressure rises The latter statement we have been unable to corroborate as with the continuous administration of a lethal dose given at the rate of 1 cubic centimeter a minute there was no apparent rise in the blood pressure curve on the kymograph

According to Cushny soluble calcium salts injected directly into the blood vessels seem to be poisonous their action resembling that of digitalis in some respects they accelerate and strengthen the heart beats but in large quantities bring it to a standstill We believe the mechanism which brings the heart to a standstill to be of considerable importance and have undertaken its study because we could find no adequate explanation of it in the literature

Throughout this part of the experiment as before 10 per cent aqueous solution of calcium chloride was injected at the rate of 1 cubic centimeter a minute until the animal died During the entire injection electrocardiographic tracings were made on each dog

From our electrocardiographic studies it seems evident that the injection of toxic doses of 10 per cent solution of calcium chloride into the blood stream of a dog will produce various alterations in rate disturbances of conduction ectopic origins of impulse and when carried to a still further point of toxicity disturbances of the fundamental co ordination of the heart and ventricular fibrillation which is followed by death Therapeutic doses have produced only alterations of the pulse rate

The first and most striking effect is acceleration of rate This has occurred consistently at an early point in the injection but is produced by a smaller amount of the solution in the normal than in the jaundiced dogs After the maximal acceleration is reached there is marked variation in rate after which the initial maximum is rarely exceeded Conduction disturbances appear marked by short recurring periods of heart block and notched QRS complexes which make their appearance more frequently as the continued injection assumes a more toxic effect At this point there has occurred an increase in the amplitude of the T wave with its gradual encroachment on the QRS complex This is rapidly followed by ventricular tachycardia ventricular fibrillation and death Ectopic origin of impulses has been demonstrated by the appearance of inverted P waves and periods of nodal rhythm

There was only one instance of an initial effect on the rate other than that of acceleration On the rapid injection of 10 cubic centimeters this animal had a progressive slowing of the rate followed by a persistent sinus bradycardia and the development of nodal rhythm To investigate the possible rôle of the vagus in this result both vagi of this dog were severed two injections of 1/1500 grains of atropine were given subcutaneously and the animal then subjected to the gradual injection of a lethal dose of calcium chloride In this instance acceleration was produced From this it might be hastily concluded that the initial slowing of the rate was the result

of vagus stimulation On repeating this experiment with Dog 3B with the vagi severed but without the administration of atropine to block the peripheral endings of the nerve a result of acceleration not of slowing was again obtained That the absence of vagus conduction may be a factor in increasing the amount of calcium necessary to produce a lethal effect is possibly suggested by the fact that a dog with the vagi severed was able to withstand a larger amount of calcium in proportion to body weight than a dog with vagi intact

The rate at which the injection is given producing a sudden concentration of calcium in the blood seems to be a factor in the relative toxicity of any dose In two instances following rapid injections the calcium content of the heart blood taken immediately after death was twice that of the blood taken from the external jugular vein

As to the effect of intravenous calcium chloride on the blood pressure no change was observed in the kymographic record on Dog 3B during the injection of 10 cubic centimeters of the 10 per cent solution On severing the vagi of this animal the blood pressure rose immediately to a higher level but fell gradually as the injection was continued to its toxic effect

Death following large amounts of calcium has been commonly ascribed to calcium rigor or myocardial spasm We ascribe it to the occurrence of ventricular fibrillation Examination of sections of the heart muscle microscopically show no evidence of segmentation fragmentation or other lesions

DISCUSSION

The relation of calcium to body metabolism has been studied intensely in the past few years particularly in relation to diseases based on a calcium deficiency of food or on diminished intestinal absorption The administration of calcium as a hæmostatic agent or more properly as a means of increasing the coagulability of blood and lessening its coagulation time is likewise not a recent development but it is still an open question whether calcium salts administered by mouth have such an effect Wright and Paramore found a distinct difference within an hour or less but Rudolph and Cole after a very careful series of studies have come to the conclusion that the free exhibition of calcium lactate by mouth has no appreciable effect on the coagulation of the blood and Van Iter after taking the coagulation time in forty persons before and after the administration of calcium lactate has reached the same conclusion Lee and Vincent by the use of intravenous calcium solutions reduced experimentally the prolonged coagulation time resulting from induced obstructive jaundice and one of us has shown a definite and constant decrease in the coagulation time of the blood of patients suffering from obstructive jaundice following the intravenous injection of calcium chloride Grove and Vines have reported effective control of hemorrhage following the intramuscular injection of calcium chloride Wright and Davies have reported its use as a styptic Cushny says that the use of calcium salts as a local hæmostatic is a failure The results obtained in the different methods of administration suggest that the need of the body for available calcium is the most important factor in the resulting effect on the coagulation time

The value of intravenous calcium in the treatment of tetany has been emphasized by MacCallum and Voegtlin Judd and other Meltzer has shown that toxic quantities of magnesium can be completely neutralized by calcium chloride

Januschke in 1910 demonstrated that pleural effusions may be checked by subcutaneous injection of calcium chloride and Chiari found that transudation and œdema were favored by the removal of calcium which normally serves to check the permeability of the vessels These experimenters were able to check pleural effusion resulting from diphtheria toxin and to reduce the conjunctival œdema resulting from the application of irritants

Blum Aubel and Hausknecht in a recent paper cited three cases of ascites the result of cirrhosis of the liver and one case of diffuse œdema which persisted unmodified by the usual diuretics in which calcium salts administered orally produced an immediate

reduction in weight and diminution of the ascites and œdema When the administration of calcium ceased the decline in weight stopped They explain that the calcium seems to be eliminated by way of the bowel and the chlorine by way of the kidneys As the chlorine is freed from the calcium it is forced to combine with the sodium the sodium is then cast off and with it the surplus of water They assert that this antagonism between calcium and sodium is even greater than between potassium and sodium Their usual dose was 11 1 grams of calcium chloride by mouth but in some cases as much as 2 grms was administered Barrier and Rockwood have been able to produce marked diuresis in patients with diabetes and nephritic œdema by giving large doses of calcium lactate by mouth

According to Cushny the soluble calcium salts are absorbed with great difficulty from the stomach and intestines and retard considerably the absorption of fluid The absorption is facilitated by the fatty acids with which they combine to form a soap of calcium which is then more readily taken up by the surface epithelium They would have a cathartic action were they not thrown out of solution very readily by the alkaline fluids The constipating effects of solutions containing calcium may also be due in part to the effect of the calcium salts after their absorption on the vegetative nervous system the excitability of which they depress and in part to their effect on the capillary vessels the permeability of which they lessen The great proportion of calcium taken either in the food or as a remedy unquestionably leaves the bulk of the food in the stools entirely unabsorbed while a small quantity of it is taken up from the alimentary tract whether it be administered in a soluble or in an insoluble form This small quantity circulates in the blood probably in combination with proteins and is slowly excreted unless there is a deficiency in the supply of lime when it may be utilized by the tissues When larger quantities are thrown into the blood by intravenous or hypodermic injection the calcium of the blood remains abnormally high for some time but all the calcium thus injected is not in the circulation throughout its stay in the body Some of it is deposited temporarily in an unknown organ and is gradually withdrawn and excreted after the first excess is eliminated

It has been generally conceded that only the smaller portion of absorbed calcium is eliminated through the kidney the intestine taking the pre eminent share in the excretory process Mendel and Benedict in an experimental study of the paths of excretion of calcium showed that little reliance could be placed on the elimination data of the oral and subcutaneous administrations as the injections were usually attended with local disturbances and the absorptive factor was entirely uncertain Following the intravenous administration of calcium chloride in normal salt solution into the jugular veins of dogs 15 per cent of the calcium was excreted by the kidneys within 3 hours and 20 per cent within the first day Diuresis followed the injection not caused by the sodium chloride carrier or by the volume of the injected solution as checked by later control experiments having to do with these factors alone No noteworthy increase in the loss of calcium with the fæces was observed In all cases in which the balance of calcium was determined a marked retention was noted The fact that the increased excretion by the kidney soon subsides speaks against a slow or gradual subsequent elimination in these cases

CONCLUSIONS

1 Calcium chloride following its intravenous injection in a 10 per cent aqueous solution is rapidly eliminated from the blood stream and shows no tendency to accumulation in the blood Following therapeutic doses as used in these experiments the blood calcium content returns to its normal level within 2 hours

2 The lethal dose of calcium chloride administered intravenously in 10 per cent aqueous solution at a uniform rate of 1 cubic centimeter a minute was 256 4 milligrams for each kilogram of body weight in normal dogs and in jaundiced dogs 386 6 milligrams for each kilogram of body weight

3 Following continued injections of calcium chloride including therapeutic doses in

normal and jaundiced dogs no evidence of toxic effect on the kidney could be demonstrated clinically or microscopically

4 *The cardiac effect of therapeutic doses* of calcium chloride as used in this study is the production of various alterations in pulse rate Toxic doses cause disturbances of conduction ectopic origins of impulse and when carried to the point of greater toxicity ventricular fibrillation which is followed by the death of the animal

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CHILDBEARING AFTER RADIUM AND X-RAY TREATMENT

By FRANK A PEMBERTON M D F A C S Boston Massachusetts

THE writer has been questioned so many times by physicians in regard to the danger of causing poorly developed deformed or backward children or even sterility in fertile women by the use of radium and X ray for therapeutic purposes that it seems probable the known results are not common knowledge These methods of treatment may be used during the childbearing age to relieve uterine bleeding caused by functional derangements of the ovary and fibromyomata which is not amenable to simpler measures At present they are not used in the fibromyoma cases if a myomectomy is feasible because operation removes the pathological cause Their effect is on the ovary the uterus and in the case of radium especially the endometrium We may disregard the last two in this discussion because permanent changes are probably not produced in them if an artificial menopause is not brought on and they are not fundamentally concerned in fertility as are the ovaries

Radiation may cause a temporary or permanent amenorrhœa or oligomenorrhœa In the cases under discussion only a temporary amenorrhœa at the most is desired and the dosage is so regulated that it is rare to cause more than that The cause of the amenorrhœa is generally believed to be the effect of the radiation on the ovaries Radium placed inside of the uterus does have a local effect on the endometrium which reduces flowing but it undoubtedly also affects the ovaries

The action of radium and X ray is essentially the same The result of radiation in the ovary is well established by the examination of animal and human ovaries after treatment Most investigators (3 4 5 7) agree on the important points The action on the follicles of the ovary is what we are interested in as they contain the ova The maturing graafian follicles are more susceptible to radiation than the primordial which is very important as will be seen In a well developed follicle the changes consist in a degeneration and destruction of the ovum and the membrana granulosa preventing the follicle from going on to maturity and leaving a small cyst (7) In less advanced follicles the ovum is destroyed but the single layer of granulosa cells is preserved (5) If the dose has not been large enough to cause a menopause however the primordial follicles remain intact capable of maturing normally Theoretically then it is possible to use such a dose of radiation that mature follicles may be destroyed and primordial follicles not damaged This is what seems to occur clinically Following treatment the patient may menstruate normally have a scanty flow or amenorrhœa for a few months depending on the size of the dose If amenorrhœa occurs with this small dosage it is followed by a re establishment of menstruation except in rare unusually susceptible cases Ovulation and menstruation are believed to be definitely related to each other Therefore theoretically if menstruation is present fertility is possible That this is clinically true will be shown later

The other important consideration is the possibility of the fertilization of a partially damaged ovum Theoretically this might result in a deformed or poorly developed child or a so called blighted ovum There appears to be no data in regard to this point No one has made a report of the examination of the products of conception in miscarriages from such cases The percentage of miscarriages is greater in radiated than in normal mothers as will be shown but this was in a small series of cases It requires further investigation On the other hand no one has reported the birth of a deformed child and only a few underdeveloped ones are found

The results of radiating fertilized eggs and the fetus *in utero* are quite different however Unterberger (8) has shown that the offspring from fertilized butterfly eggs which have been radiated produce adults only two thirds as large as normal and the next generation is

even smaller Experiments on cold blooded animals have shown malformations and lack of development after radium or X ray treatment of the eggs or fetus (1) There are a few similar observations on warm blooded animals such as those made by Forsterling and Cohn who found backward development in guinea pigs whose mothers were radiated during pregnancy (1) There are a few reports of similar cases in humans

Reports of children born from mothers previously radiated for functional or fibroid bleeding are few and mostly incidental to other subjects The largest group of cases that we have seen is reported by Werner (9) From November 1911 to January 1919 990 cases of menorrhagia and 522 of fibromyomata were treated by radiation He has been able to collect 24 pregnancies following the treatment in these cases These resulted in 13 well developed normal children 1 premature 9 abortions at from 2 to 5 months and 1 hysterectomy for fibroid at 5 months Two of the living children three of the miscarriages and the operated one followed amenorrhœa of several months duration The other mothers had oligomenorrhœa Of the 9 abortions 3 were induced Therefore there was 1 abortion to about every 2 normal births which is rather high as in Germany it is generally 1 to 5 All the living babies were normal and developed normally It must be remembered that although the number of pregnancies seems small for such a large number of cases we have no data as regards the number who were still capable of bearing children This series includes patients of all ages married and unmarried and relatively few radiated patients are in the child bearing age

Steiger (6) reports a pregnancy following X ray treatment of a fibroid uterus reaching almost to the umbilicus in a woman 39 years of age after amenorrhœa of 4 months duration This resulted in a normal 9 pound baby well and strong 1 year after birth He cites a case of Jankow occurring after amenorrhœa for 18 months Three years after birth the child was undernourished but this might have been due to war conditions Jungermeister (6) reported a normal child following a 6 months amenorrhœa Schumann cited by Heiman (3) reports one Heiman (3) had one in a patient 43 years old following radiation oligomenorrhœa and at 3 years the child is well and strong Ferrari and Laffont (2) report one

At the Free Hospital for Women reports have been obtained from 25 married women in the childbearing age treated by Dr W P Graves with radium inside the uterus for uterine bleeding Their average age was 34 Four of them report pregnancies after the treatment as follows

31 243 age 34 had a miscarriage in March 1919 She received 600 milligram hours of radium on August 5 1919 Menstruation began in November 1919 She bore twins in March 1921 both normally formed one of which died 4 days later from unascertained causes The other is living and well 2½ years old

28 56 age 31 had had no pregnancy previously Radiation She received 600 milligram hours of radium on November 7 1917 Her menstruation began 3 weeks after treatment was regular for several months and then irregular the longest interval being 5 months She bore a normal baby on September 25 1919 which is now well and strong 4 years later

29 111 age 34 had borne eight children previously to the treatment She received 400 milligram hours of radium on January 16 1918 She had eclampsia resulting in a premature birth at 7½ months on January 30 1922 The child lived two days

34 162 age 24 had had no previous pregnancy She received 200 milligram hours of radium on April 5 1921 for membranous dysmenorrhœa She became pregnant and miscarried at about 3 months on January 1 1922

There are doubtless other cases reported which the writer has not been able to find because they were reported incidentally under other subject

Radiation of the fetus during pregnancy gives quite different results as has been shown by animal experiments It frequently causes underdevelopment Werner (9) cites two cases in which one patient was X rayed and the other treated with radium placed in the vagina during pregnancy because of a mistake in the diagnosis The child born to the first was normal at birth but 6 pounds underweight at 6 years The child from the second was small but perfectly formed at birth and about 1 year backward in physical development at 3½ years of age Steiger (6) says

that the procedure may cause abortion during the early months of pregnancy but not in the later Aschenheim (1) reports a case in which a mother was X rayed during the third to sixth month of pregnancy on the diagnosis of fibromyoma The child was a microcephalic imbecile with optic atrophy and cloudiness of the lens of the eye the latter being characteristic of changes in the eye of experimental animals

It is evident that a patient can be treated with radium or X ray and bear normal children subsequently We have no data on whether or not such treatment decreases the chance of becoming pregnant in women who wish children and it would be difficult to get reliable information It is probably true that deformed or undeveloped children are not likely to follow such treatment A damaged ovum is not capable of being fertilized or if it is it probably results in a blighted ovum which comes away by miscarriage It does seem that the chance of a miscarriage is greater than in untreated women It is important to examine the products resulting from such miscarriages to find out if the fetus is absent or deformed

Care should be taken not to treat pregnant women because it may cause a poorly developed or deformed child More reports are needed to decide all these questions

The writer gratefully is indebted to Dr W P Graves for permission to report his cases and to Mr R H Smithwick for looking up the cases for him

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CERVICAL SYMPATHECTOMY FOR THE RELIEF OF PAIN

REPORT OF TWO CASES TREATED SURGICALLY FOR ANGINA PECTORIS

BY F JANNEY SMITH M D AND R D McCLURE M D F A C S DETROIT
From the Henry Ford Hospital

CERVICAL sympathectomy has been done by various surgeons since 1896 Jonnesco (8) reports that since 1806 he has done this operation about two hundred times The majority of his patients were suffering from epilepsy a few from trigeminal neuralgia or migraine and a good many from hyperthyroidism

Franck (7) in 1899 suggested resection of the cervical sympathetic for relief of pain in angina pectoris but did not do the operation nor did anyone follow his lead until Jonnesco in 1916 operated upon his first patient with angina pectoris and in the few years following did similar operations on five other such patients Tuffier (13) also reported one case operated upon with relief

Other authors soon reported cases although in the interval between October 1916 when Jonnesco (9) reported his first one and the present time the total of reported cases is few considering the rather glowing accounts of improvement in individual patients Veraguth (12) of Stockton California in 1922 reported 4 cases of resection of the left cervical sympathetic followed by complete relief of pain

The most comprehensive report of patients so treated in this country was by W B Coffey and I K Brown (3) San Francisco California in February 1923 when they told of 5 cases operated upon and later in June 1923 Brown (3) reported 1 more Of these 6 cases 5 were greatly relieved One died shortly after operation

One other case is reported by Bacon (1) and still another well observed case by Bruening (4) in Berlin

Just how the relief from pain is accomplished is a matter of a great deal of debate Jonnesco citing as his authority Mueller (11) believes that the only afferent cardio aortic path that can convey sensory stimuli are to be found in the cervical thoracic sympathetic chain and it is thought that interruption of this path by removal prevents the overflow of a painful stimulus into the spinal cord and the sensory nerves that arise from the particular segments in the neighborhood Other benefits of cervical sympathectomy are supposedly a generally lowered blood pressure thus preventing overdistention of the aorta removal of the possibility of death by vagal inhibition or medullary angiospasm and a supposition of some authors (4) that there is apt to be a decrease in coronary vasoconstriction after sympathectomy and therefore improved blood flow Bayliss (2) states that there is at present no definite proof of any such vasomotor nerve control of the coronary vessels and therefore such ideas are purely speculative but during operation Bruening has observed constriction of the vessel of the arm on the same side when the superior thoracic ganglion is pulled upon and conversely after section of the sympathetic on the left evidence of vasodilatation in the left arm and slight increase in local temperature It seems tempting to reason by analogy that a similar effect might be produced in the coronary circulation

Jonnesco advocates the resection of the entire cervical sympathetic chain below the level of the superior cervical ganglion including the first thoracic ganglion the operation to be done on the left side first and later followed by a similar one on the right if complete relief is not obtained as a result of the first resection

Coffey and Brown also Bacon report relief by much less extensive procedures in some cases simply by section of the sympathetic between the superior and middle cervical ganglia with the cutting of the superior cardiac rami of the upper ganglion or by removal solely of the superior ganglion

More recently Eppinger and Hofer (6) taking the position that angina pectoris attacks

are secondary chiefly to aortic pathology and not to coronary artery disease and that the main nerve through which afferent impulses pass from the aorta is the depressor nerve have concluded that division of this structure hould prevent the painful attacks Hofer has carried out this idea in operating on 6 patients dividing the structure bilaterally where possible and reports 4 cases completely relieved 1 doubtful result and 1 death from bronchopneumonia following tracheotomy He ventures the opinion that Jonnesco and Bruening in their operations on the cervical sympathetic may have without realizing it sectioned these fibers This is vigorously denied by Jonnesco (10) in a late communication These two writers differ radically as to what constitutes the main afferent path carrying the sensory impulses arising in the heart or aorta during the anginal attack but paradoxically both seem to be successful in preventing its arrival in the central nervous system by their different methods of procedure

Jonnesco cites several valid objections to the operation on the depressor nerve fibers The main drawback is encountered in the difficulty of identifying these fibers in the human They are subject to considerable variation being included in the vagus nerve and leaving it at a rather inconstant level constituting an inconspicuous nerve filament hard to recognize The risk of injury to the superior laryngeal nerve from which these fibers often branch with consequent necessity of tracheotomy is also a considerable objection

At any rate ease of approach and certain identification of important structures together with the constant favorable results in suitably chosen cases seem to make the Jonnesco operation a simpler and more generally useful procedure

The operation has usually been done under local anæsthesia alone or combined in many cases with gas oxygen Coffey and Brown s one fatal case was the only one in which they were obliged to use ether on account of the struggles of the patient while under gas oxygen

The common after results of resection of the cervical sympathetic are well known The characteristic enophthalmos together with pupillary miosis usually develops promptly on the side of operation Occasionally there is noted some transient conjunctivitis on that side

As to the indications for operation these are rather difficult to define sharply but at least it may be stated that regardless of the etiology of the angina pectoris—whether or not the pathological basis is syphilis of the aorta or arteriosclerosis of the aorta or coronary arteries—when the seizures are so severe or frequent that following an occupation is impossible and life in general is intolerable resection of the cervical sympathetic on one or both sides especially if the superior thoracic ganglion is included does offer a decided probability of considerable relief from pain and of return to gainful occupation

Whether or not the life of such an individual can be prolonged or the efficiency of the heart s contractions improved by such a procedure is another matter Many believe that this is the case P K Brown reports one patient whose electrocardiogram showed negative T waves which returned to iso electric after operation Jonnesco mentions increased ability to withstand exertion following convalescence from operation But it must not be forgotten that angina pectoris is a symptom and not a disease and the prognosis of the cardiac condition should be carefully considered before the operation itself is advised

As to ill effects on the heart from the operation exclusive of immediate effects of the anæsthesia and manipulation it seems clear that there is none Jonnesco has never been able to discover any in 00 cases and there is no deprivation of the mechanism of cardiac acceleration under increased work

The sole contra indication to operation seems to be existing cardiac failure Recently two of Jonnesco s patients were suffering from some degree of failure at the time of operation and both died after the operation He therefore advises against attempting the operation unless the cardiac condition is sufficiently good to enable the patient to reap some benefit from its result

Some might feel that in general the seizures of angina pectoris are in a measure a protec

tive mechanism that prevents the patient from continuing to exert himself past the point of safety and that it is unwise to take away this warning if theoretically the absence of such warning might tend to shorten life We can find no mention of any such tendency in the postoperative course of reported cases However it would indeed be well to observe these patients frequently after operation and they should be strictly enjoined against overexertion

REPORT OF CASES

CASE 1 (25258) J H tool and die maker age 46 was admitted to the hospital first on January 3 1923 complaining of hernia He stated that he had a primary lesion on the genitalia at 22 years for which he never received any treatment and that he has a son now aged 20 suffering from congenital syphilis with syphilitic keratitis For 2 months previous to admission he had had attacks of severe agonizing precordial pain radiating down to the left arm as far as the wrist The attacks were brought on chiefly by exertion excitement anger getting out of bed in the morning and on going out into the cold air after work There was some dyspnoea at the time of the attacks of pain but at no other time There was stated pain in the neighborhood of the left shoulder and difficulty in using the left arm *He was referred to the hospital requesting operation for bilateral inguinal hernia*

The past history was unimportant save for the history of luetic infection at the age of 22

Examination There was some pallor of face and cheeks and evidences of poor nutrition The pupils reacted to light sluggishly to light The eyes and ocular were normal tonsils rather large There were several crowned teeth A few lymph nodes were palpable at the angles of the jaws The chest was normal in appearance the lungs were clear The heart was marked limitation of motion of the left arm at the shoulder and pain on passive motion with marked diminution in the volume of the left radial pulse Blood pressure right arm systolic 118 mm diastolic 35 left arm — systolic 70 diastolic 40 Relative cardiac dullness 12 centimeters to the left of the mid line in the fifth interspace and 4 centimeters to the right of the sternum Regular rhythm —70 per minute The entire systolic murmur in the aortic area and a prolonged diastolic murmur These were heard along the left border of the sternum A blowing systolic murmur was also heard at the cardiac apex and in the axilla There was no hypertension or varicosities Edema of the ankles There was a right and left inguinal hernia

Urine examination Normal findings Wassermann 4 plus with plasmin and cholesterinized antigens Spinal fluid shows normal findings and negative Wassermann Fluoroscopy of the chest shows slight cardiac hypertrophy and dilatation of the aortic arch but no aneurysmal formation X rays of the left shoulder show evidence of slight atrophic changes in the outer end of the acromion and clavicles

Diagnosis Syphilitic aortitis with aortic insufficiency and angina pectoris Bilateral indirect inguinal hernia Chronic synovitis of left shoulder

Treatment In view of the fact that the patient *had had no antiluetic therapy at all it was deemed* advisable to postpone operation for hernia until after he had been given a suitable course of treatment He was given 1/100 grains of nitroglycerine for the relief of pain and this did cut short his attacks From March 13 to October 10 he was treated intensively with potassium iodide and given seven injections of neoarsphenamine intravenously as well as numerous intramuscular injections of mercurial thevlat Nevertheless the attacks of precordial pain gradually increased in frequency and intensity especially at night greatly interfering with his rest and preventing him from following his occupation The patient expressed himself repeatedly as thinking he were dead and declaring Were it not that I am a family man I would certainly shoot myself

Operation The operation of left cervical sympathectomy was done by one of us (R D McC) November 13 1923 under local anesthesia supplemented by nitrous oxid and finally ether Just *before the operation the patient had severe attack* of precordial pain and was given nitroglycerine It having been determined to do as little as possible the middle cervical ganglion as well as the small connecting branches going to the superior cervical ganglion were removed through the sympathetic cord as high as the superior cervical ganglion The patient's pulse decreased to 56 as the vagus nerve was lifted forward At the end of operation he this was dropped back the pulse became markedly accelerated

Following operation left enophthalmos and miosis of pupil were noted The patient experienced no pain until 4 days after operation when he had one mild anginoid attack radiating as usual not requiring nitroglycerine for relief Electrocardiogram (Fig) made 6 days *after operation showed no* marked abnormality He was discharged from the hospital 16 days after operation in fairly well

December 1 1923 He states that he had a bad old and feverish time but returned home stayed in bed and *had no pain but for the first week* after recovering from the old he now has his attacks about four times a night and 1 in the day The attacks are about half as severe as before operation and cease to be One especially dreadful symptom has principally which he has been occurring six to eight times a night and prevented sleep

January 1 1924 He still feels his life quite intolerable on account of the frequency of having



Fig. 1. Electrocardiogram. Case 6 days after operation.

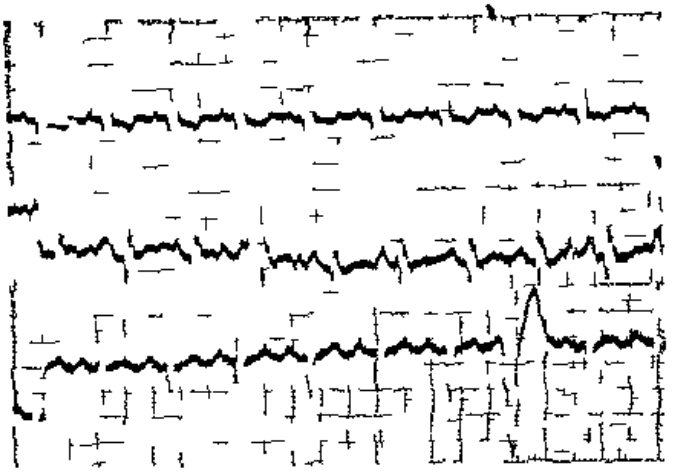


Fig. 2. Electrocardiogram. Case 2. November 8, 1923. 2 days before operation.

noid attacks. Would shoot myself if I were not a married man.

At a second operation, January 18, 1924, a right cervical sympathectomy was done under novocain and gas-oxygen anæsthesia. The right middle and lower cervical sympathetic ganglia were resected.

Two days after operation he experienced two typical anginoid attacks.

March 9. The patient states that following the second operation priapism did not recur. For the first 2 weeks he had daily a good many rather mild anginoid attacks, but since this time he has had not more than two daily—one at bedtime and more often one on getting up in the morning. These are mild and are easily relieved by nitroglycerine. He sleeps soundly through the nights now for the first time in a year and a half and has been able to return to work. His fellow workmen suspect him of using alcohol to excess on account of his ruddy color and heavy lidded appearance.

He shows miosis of the pupils and bilateral enophthalmos, but no other disturbance has been noted following the second operation. He states that life is now much more worth while and he is quite pleased with the result of the operation.

April 11. He is having very few attacks, often goes for days without any, and when they do occur they are slight. Complains today of some soreness at the lower end of the incision in the right side of the neck and of a little difficulty in raising the right arm above the head. Examination reveals that there is paralysis of the right trapezius and shoulder drop on that side. He is not sure whether this is a recent development or not. The cardiac findings are essentially unchanged since before operation. He again expresses himself as having been very much improved by his operation. The shoulder does not trouble him since he is now doing clerical work.

Case 2 (35055). D. L., retired, age 69. Admitted to the hospital November 8, 1923, complaining of attacks of *precordial pain*. The attacks have been present for 10 or 12 years and consist of intense agonizing pain over the lower sternum, radiating principally to the right front of the chest and down the right arm to a lesser extent to the left of the mid line and rarely down the left arm. The attacks occur often during the day, initiated by exertion or excitement, but are especially frequent and severe at night, occurring eight or ten times and preventing rest. He has been taking nitroglycerine over a long *period of time for relief of pain*, but the relief is rather slow in coming and the frequency of the attacks is undiminished. He is dyspnœic on very slight effort, but there has never been any œdema. He *continually suffers the* torture of the damned and states that his life is not worth while this way.

The past history was unimportant.

Examination. The patient is an elderly man with *no dyspnœa or cyanosis*. The pupils are equal with normal reaction to light. Ears and nose are *negative*. There are a few crowned teeth. The chest is well formed and the lungs clear. The heart is *moderately enlarged*. Cardiac dullness 11.5 centimeters to the left in the fifth interspace and 3 centi*meters to the right* in the fourth interspace. Blood pressure 135 systolic and 75 diastolic. There are

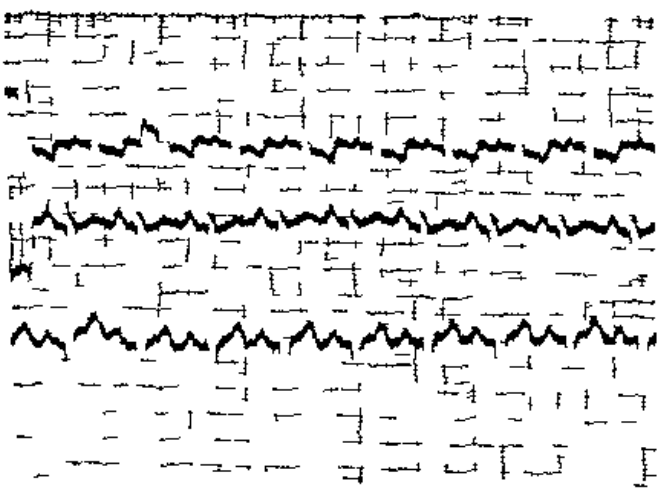


Fig. 3. Electrocardiogram. Case 2. November 27, 1923. 7 days after operation.

no murmurs Fluoroscopy of the chest confirms the impression of moderate cardiac hypertrophy and also shows the aortic arch to be somewhat tortuous with a prominent aortic knuckle and slightly dilated The radial wall is considerably thickened There is no œdema and no enlargement of the liver but the patient becomes dyspnœic on slight effort and is observed to have frequent severe attacks of precordial pain for which relief is finally afforded after the administration of nitroglycerine

Urine examination shows normal findings save for occasional hyaline casts Phenolsulphonephthalein excretion 57 per cent in 2 hours Wassermann negative Non protein nitrogen 30 milligrams per 100 cubic centimeters of blood

Electrocardiogram (Fig 2) November 8 1923 shows very pronounced left preponderance and inversion of T waves in lead 1 left ventricular extrasystole

Diagnosis Severe grade of chronic myocarditis and coronary sclerosis with angina pectoris Prognosis poor Operation was not advised but was offered as an alternative to the hitherto unsuccessful medical treatment as a measure of relief of pain

Operation Left cervical sympathectomy November 20 1923 The patient was prepared by preliminary administration of scopolamine and morphine but in spite of this had a very severe anginoid attack on arriving in the operating room One of us (K D McC) resected the sympathetic cord below the superior cervical ganglion including the middle and inferior ganglia During the manipulation of the sympathetic there was noted cyanosis of the left side of the forehead and coolness of the left arm

Following the operation the patient was entirely free from pain for 2 days On the third and fifth days he had slight anginoid attacks for which nitroglycerine afforded relief Electrocardiogram (Fig 3) on November 27 gave identical findings with previous one except that there were no extrasystoles

Alternating pulse was noted in recording blood pressure The systolic was 120 and the diastolic 70 The patient was discharged on November 30 and went to his home in Windsor Ontario Subsequent information is derived from a letter from the patient and conversation with his son

Letter on January 24 1924 states I am improving slowly The soreness in my neck and left shoulder is becoming less While I still have those pains *in my chest they are not as severe as before the* operation They seem to settle principally in the right side under the right arm and breast I am able to exert myself but very little

March 1 1924 The son relates that ever since the operation the father has had hardly any pain but recently he has developed shortness of breath and severe cough It is presumed that he is having *some degree of myocardial failure* He expresses himself on behalf of the family as being more than satisfied with his father's course following operation and believes that his life in the interval was made much more comfortable than before the operation *He is being kept in bed and is under the care of his family physician*

April 1 1924 the family physician reports by telephone that the patient is in a grave condition *of myocardial insufficiency* with general anasarca

COMMENT

*The occurrence of priapism in Case 1 dur*ing the interval between the first and second operations is unusual and we are not able to find any other reference to such occurrence in the literature It may have possibly been due to the production of irritative stimuli in some way in the sympathetic system from lack of balance on the two sides which was later equalized after the other side was resected At any rate it was a very marked *feature during the interval between operations* and disappeared promptly following the second operation

We do not believe that the shoulder drop in this case is due to section of the spinal accessory nerve on this side since particular care was taken to avoid dividing this structure at operation Undoubtedly its function has been terminated for the time being through outstretching but we are in hopes that later *on this paralysis will clear up*

It is apparent from these two cases that while we are able to report in each a great decrease *in the frequency of the seizures and a* marked reduction in their intensity following these operative procedures in neither did we obtain complete freedom from the painful attacks In Case 1 patient with syphilitic aortitis this may have been because we did not remove the first thoracic ganglion on either side as has been *urged by Jonnesco* This falls in with the failure which attended that author when in one instance operating away from his usual surroundings without certain special instruments he resected the cervical sympathetic without the stellate ganglion In Case 2 patient with marked arteriosclerosis and pain which was mainly radiated to the right front of the chest and right arm it would no doubt have been better to have *resected the right sympathetic chain* instead of the left since after left sympathectomy the sinistral radiation of pain to the right persisted in some degree This case is of partic

ular interest when compared with the one which was reported by Philip King Brown with dextral radiation of pain in whom complete relief followed the resection of the right superior cervical ganglion

CONCLUSIONS

While in many cases resection of the cervical sympathetic in angina pectoris unilateral or bilateral may greatly lessen the number and minimize the intensity of the painful attacks it must not be counted on to secure complete relief from pain unless the first thoracic ganglion is included in the resection

The resection should be done first on the side which has shown the greatest or most severe radiation of pain and followed later by a similar operation on the other side if complete relief is not obtained after the first one

As has already been pointed out by Jonnesco more favorable results may be expected in those individuals in whom the painful attacks dominate the picture while the cardiac compensation is good than in the patients who give evidence of grave heart muscle damage or are already in a state of cardiac failure

The main indications for operation are

1 Frequent and severe attacks necessitating the giving up of occupation and not yielding satisfactorily to medical measures

2 A feeling on the part of the patient that the painful attacks provide an intolerable situation

The main contra indication for operation is existing or impending myocardial insufficiency

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BENIGN TUMORS OF THE PLACENTA

A Review of the Literature and Report of a Chorio Angioma[1]

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A CASE of benign tumor of the placenta was first reported by John Clark in the Philosophical Transactions of the Royal Society of London in 1798 Since that time there has been reported an average of less than one case a year The period from 1798 to 1913 has been well summarized by Yamato (1913) He collected 116 cases and added one of his own His conclusions are most valuable and will be referred to later During this early period and included in Yamato's series notable reports were made by Virchow (1863) Goodhart (1882) Galabin (1882–1885) Albert (1898) Dienst (1901–1904–1906) Ries (1904 the first case reported in American literature) and Pitha (1907) In addition to the cases reported by Yamato in my review of the literature I found two additional cases reported by Albert (1898) one by Alin (1891) one by Bohnke (1903) one by Dion (1897) and one by Lowenberg (1898)

During the period 1911 to 1924 30 cases were reported only 6 of these being cited in the American literature The bibliography at the conclusion of this article gives a complete record to date

The general term angioma of the placenta has been insufficient according to many writers as evidenced by the numerous terms used for this type of tumor fifteen in all namely angioma myxofibroma subchorial placental cysts fibroma simple organized coagula cellular hyperplasia myxoma fibrosum telangiectodes placental polypi connective tissue hyperplasia hyperplasia angiomatosa hyperplasia of the villi of the chorion false knots formed by the umbilical cord within the placenta varicose veins in placenta placentitis fibrosa polypous hæmatoma The writer is inclined to favor the term *chorio angioma fibrosum* which term was accepted by Pitha This term is self explanatory and differentiates this type of tumor from those arising from the epithelium which are malignant

Most writers agree as to the origin of these tumors namely the chorionic villus The proliferation arises from the capillaries which cannot be designated merely as villous capillaries and from vessels of the allantois

The etiology of benign placental tumors is a much debated question Yamato has mentioned the following views (1) the inflammation theory ( ) developmental anomaly (3) hyperplasia theory (4) bleeding theory (5) parasitic origin and (6) congestion (a) on the part of the fetus (b) on the part of the mother and (c) modifications in the blood vessels themselves

Dienst agrees with the congestion theory He points out that his first case was that of a woman suffering from arteriosclerosis and at a period just before the climacteric and the child was born with symptoms pointing to an impediment in the outflow of venous blood These symptoms pointed with the greatest probability to primary maternal and secondary fetal circulatory disturbances Such symptoms were still clearer in his second case in which there were signs of incompensation of the heart in connection with renal troubles resulting in interrupted pregnancy Thus he maintains the foundation for the development of the tumor is laid by a congestion in the maternal organism toward the end of the third week of the placental period

Yamato's argument is as follows Granted that in the parturient there is a general congestion if this alone can lead to angioma we would expect to find not only placental angioma but angioma of the skin liver spleen kidney etc As a matter of fact in many cases of placental angioma there are no symptoms of congestion anywhere Since an angioma forms in the placenta only the remote cause of the tumor must certainly lie in the villous tissue

[1] Read before the Chicago Gynecological Society March 1924 (For discussion see p 5)

With this point in mind we may infer that the complication such as congestion syphilis etc are at the most only proximal causes

Yamato accepts with modifications the Cohnheim and Ribbert theory of the etiology of tumors At the beginning of the embryonic period the mesoderm (which forms the allantois capillaries that supply the villi and form their connective tissue membrane) abnormally persists at the location at which the formation of the villi takes place

Albert states that when the allantois in association with the chorion enter into the formation of the decidua a part of it remains behind to contribute to the formation of the umbilical cord From this latter part a blood vessel branches off find no normal association with other parts and thus develops independently into a tumor

Pitha who reported a large number of cases holds to the congestion theory and believes that the congestion gives the impulse to a proliferation of the embryonic tissue which in turn can cause a telangiectatic malformation of the chorionic villi The tasts of the blood can in turn be caused by a large variety of causes leading to narrowing of the lumen as for instance kinking at the insertion of the umbilical cord varicose dilatation of the veins spiral arteries looping or twisting of the arteries etc

The writer agrees only in part with the theory of congestion on the part of the mother because in those cases reported in which the age of a patient is mentioned the majority were under the age of 30 therefore their case would not be complicated commonly by arterio clerosis or oedema accompanying a nephritis or an uncompensated heart condition There would be more or less exception If this type of tumor is to be classed as a real tumor I agree with the theory of Cohnheim in that a congenital basis is necessary for the development of any tumor and with Kuster as regard a placental angioma being a congenital tumor derived from the blood vessels of the villi

These tumors are generally found in the midst of the placental tissue in the chorionic membrane (Kiss) protruding as a rule on the fetal surface of the placenta Lining formed by Langhan s cells with little syncytium The majority are encapsulated Kermauner summarized what is known concerning these placental tumors describing them as tumor consisting of sharply defined nodules of lobulated structure connected with the chorionic epithelium by one or more pedicles and with the rest of the placental tissue in various ways by secondary fibrinous adhesion lying in the intervillous space and touching neither the chorionic epithelium nor the decidua directly Usually they are solitary but multiple ones have been observed

Yamato in his list of 8 cases in which the ages were given found that 25 per cent were between 17 and 20 years 25 per cent were between 6 and 30 years and 17 85 per cent between 1 and 25 years The majority were under 30 years and generally primipara He also stated that in most of the cases summarized the patient s health was good previous to and during the pregnancy Of the few complications hydramnion was the most common In his list of 116 cases maternal lues was not confirmed in any instance He found only two writers who mentioned bleeding one case by Labhardt being worthy of mention

The patient 42 years old while on a railroad journey noticed sudden pains and bleeding A premature birth occurred In the placenta was a tumor which had perforated in the middle of the maternal surface In the tumor was a hæmatoma from which as a result of the contusion there was an infusion of blood The case is instructive and offers suggestions for further investigations

Chorio-angiomata of the placenta vary in size from that of a walnut to the size of a kidney and a few tumors have been reported that have covered two thirds of the placental area They play very little part in the pathology of labor A number of cases are cited that were pathological and in which the tumor was discovered I found only one case in which it acted as a mechanical obstruction to the advance of labor The case was reported by R D Margeson of Boston 1919

The case is that of a patient who had irregular hæmorrhages across the lower part of the abdomen and back at irregular periods during pregnancy She had no toxic symptoms during her entire preg

nancy The patient went into labor at term and after 12 hours of regular pain which had gradually increased in severity examination showed little dila tation of the cervix with no engagement of the head A classical cæsarean sect on was performed and a normal 8½ pound baby was delivered The pla centa which was attached to the posterior wall of the uterus was freed with difficulty Attached to the placenta by a pedicle 6 centimeters long was a tumor 10 by 6 by 3 centimeters When found the tumor was overhanging the left pelvic brim and this in all probability was the obstacle which prevented the engagement of the head The pedicle was sur rounded by amn otic membrane and had no uterine attachment in this way differing from the succen turiate The principal content of the pedicle was fibrous tissue

The microscopic findings show great con formity (Kermauner) The chief features noted are the embryonal connective tissue and the cavernous capillary proliferation Ac cording to which of these two features predomi nates they are spoken of as fibroma or myx oma and as angioma but although these terms may still be used it must be recognized that the tumors in spite of the varying out ward appearance are of absolutely the same character The chorionic epithelium is in volved only secondarily in the proliferation and in an entirely subordinate manner In the tumor formation in contrast to hydatid mole it has no share

Before reporting my own case with its detailed microscopical description I have thought it of interest to repeat here parts of the original report of the first placental tumor by John Clark in 1798

The tumour which ga e occas on to this paper is ho vever one instance to prove that these vessels are capable like those in other parts of forming solid organized matter and that very considerable deviations from the ordinary structure of the pla centa may exist and be perfectly compatible with the l fe and health of the fœtus

Prev ously to the birth of a healthy child an amazing quant ty of liquor amnii was evacuated which was by accident received in a vessel and being afterward measured was f und to amount to two gallons Winchester measure When the pla centa came a ay a hard sol d body was found in its substance It was p eserved by Mr Mainwar ing under whose care the case occurred and was by him obl gingly presented to me Fine injection was thrown into the arte es and veins of the funis umbilicalis when they were filled they appeared to be enlarged thr ce beyond their natural size

The placenta thus prepared was subj cted to examination Its anterior surface was found to be covered with the amnion behind which lay the cho rion as usual Some branches both of the arteries and veins coming from the funis ramified in the com mon manner forming the fœtal portion of the pla centa Others of very large size not less than a swan s quill were sent to the tumor wh ch was situated behind the chorion and lay imbedded in the fœtal portion of the placenta The general form of the tumour was oval about four inches and a half long and three inches broad The thickness of it was three inches It weighed upwards of three ounces Its shape resembled that of a human kid ney one edge being nearly uniformly convex whilst the other where the vessels approached it was a l ttle hollowed If the mere existence of such a tumour is not to be considered as a disease there was no appearance of any morbid tendency in any part of it The whole structure seemed to consist of a regularly organized matter throughout sup plied with vessels exclusively belongi g to it elf and not passing to it from the surrounding parts as is generally the case in diseased masses

They who are inclined to cons der every ne appearance in the structure of parts as dis a e may be disposed to include this under that appellation But disease consists of such an alteration in the structure or function of a part as occa ions the natural operations of it to be imperfectly performed or entirely arrested This tumour appear to have produced no such affect all the common known functions of the placenta were performed notwith standing the existence of this substance I am dis posed therefore to cons der this fleshy substance as a solitary inst nce of a formati e property in the vessels of the pl centa which they have not been hitherto known generally to possess

There was a remarkable circumstance attend ng this case which ought not to be lost sight of vi the extraord nary quantity of liquor amnii wh ch had been contained in the ovum What connection there was between th s and the tumour cannot be ab olutely explain d from a single instance as there did not seem to be any direct communic tion be tween the tumour and the cavity of the amnion The whole of it lay as has been before related be hind the chorion so that between it and the cavity of the vum there were two membranes interpo ed In ts organizat on it had all of the appearance of a glandular part and was extremely vascular but upon a very attentive exami ation of it no duct could be found lead ng from it into the cavity of the o um

Yet although it may appear d fficult to prove that the quantity of liquor amnii depended upon this substance still as it so cons derably exceeded that which is found in common or has ever been described it is reasonably to be believed that it did so

The manner however by wh ch the secreted flu d was conveyed from the tumour nto the gen

eral cavity of the ovum must still remain unaccounted for

A report of my case follows

The patient was a primipara age 32 years Her pregnancy was normal the urine was negative and the blood pressure averaged 118 millimeters She went into labor spontaneously at full term The labor was short covering 4⅞ hours Delivery was accomplished with low forceps after the head had been on the perineum 30 minutes The placenta was expelled spontaneously after 15 minutes by the Duncan method The baby weighed 6 pounds and 12½ ounces and was in good condition The convalescence of the patient was uneventful excepting for a low grade temperature on the fourth and fifth day postpartum The report on the placenta by Dr J L Williams is as follows

Pathological report of placenta December 19 1922 The specimen is a placenta 20 by 18 by 3 centimeters with fetal membranes apparently complete and 55 centimeters of umbilical cord attached The fetal membranes and umbilical cord are stained brown Opposite the attachment of the umbilical cord and in the placental substance there is a dark red firm mass of uniform tissue 5 by 4 5 by 2 5 centimeters and weighing 70 grams This mass is encapsulated and can be shelled out of its capsule Running into this mass is a branch of one of the placental vessels and the lumen here is practically obliterated Careful and repeated sectioning of the placenta fails to reveal any other tissue similar to the mass previously described The placenta fetal membranes and umbilical cord together weigh 657 grams

Microscopic examination Sections of this tumor mass reveal multiple blood vessel spaces of irregular size filled with blood and lined with endothelium There is a small fibrous capsule very indefinite in outline surrounding the body of the tumor Most of the blood vessels of this tumor have thin walls but occasionally there are groups of larger thick walled vessels resembling arteries The large artery supplying this tumor is partially thrombosed

Diagnosis Hæmangioma of the placenta

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SOME PROBLEMS OF DRAINAGE

BY SIR HENRY M W GRAY KBE CB CMG LLD MB (ABERD) FRCS (ED) MONTREAL
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My very simple remarks concern what seems to many a very simple business It is easy enough to say When infection is present or is threatened drain the wound! But the war made some of us think about the matter a little more than we had thought about it before because it was found that in war wounds drains might even do harm rather than good

It is a good thing always to keep in mind the truth of the statement that the success of large problems depends on proper ap preciation and application of often apparent ly insignificant details

In directing your attention to the question of drainage I should like to point out that I have for a very long time thought that we surgeons do not give nearly enough credit to a patient s natural recuperative powers and that we do not have enough faith in these in the ordinary run of cases which come under our care Indeed it was many years before the war that I began to wonder whether in the matter of drainage we were not sometimes interfering with natural proc esses of healing actually in a deleterious and unnecessary way It must be nearly 20 years ago that as a result of such cogitation I desisted from employing drainage of the abdominal cavity in cases of what might be called simple gangrenous peritonitis i e cases unaccompanied by spreading peritonitis and now I drain the peritoneal cavity only in rare cases it matters not whether localized abscess or spreading peritonitis is present

I think that the use of drains at the present time is still too indiscriminate The question Why should I drain in this case? is too seldom asked Few seem to get away from a routine which was instituted at a period when pus was a source of dread instead of a thing to be thankful for to be regarded as

evidence that the patient s resisting powers had put up a good fight and that the surgeon was lucky to have a patient left on whom he could operate *ante mortem* The problem is a difficult one in many cases but I believe that in the majority of localized inflammations we may look upon pus really as a laudable thing We should probably all be dead if pus had not formed within us at one time or an other in our history Further if we provide free exit for the cause of the suppuration that is if we can accomplish thorough ex posure and evacuation of all the deleterious material in an abscess we shall get quicker and better results if we do not employ drainage by tube in the way it is so frequently applied In some parts the natural powers of repair are so strong that we can often dispense with drainage altogether In these parts especially in the peritoneal and pleural cavities and in joints the employment of drains actually may *lead to very troublesome sequelæ* and complications

What happens when an acute local in fection occurs one which is amenable to surgical treatment? When I think of the offensive and defensive processes which come into action I feel that they can be likened in most ways to those which occur in a war be tween nations There is the initial cause whether it be an apparently insignificant dis turbance or a gross insult which may become so magnified that it may ultimately call into play all the available resources of the nation or of the individual in order to cope with the attack Where the original boundary line has been forced *neighboring fighting phagocytes* are hurried into the breach local tissue cells are enlisted to repel the invader and a first line of defense filled with reinforcements is rapidly thrown up to take the place of the dead and dying which lie inert in the abscess cavity where the attack began Messages are dispatched from the scene of action to headquarters by nerve impulses and by various other methods of signaling danger all the tissues of the body are called into activity Poisonous influences may filter through— enemy agenci s may develop—to such an extent that this reaction may be too feeble or too long delayed to save the situation and the patient is overcome or permanen ly maimed But in the prospect of success the resistant forces accumulate locally and are well supplied with potent counteractives and good food Thus encouraged they overcome the enemy and cast him out After a period *of soreness of disability of impaired* func tion convalescence sets in and according to the degree of the local devastation and of the drain on general resources conditions may or may not be speedily restored to pre war levels

In how far does the use of the old fashioned drainage tube help the local condition? In different situations in which I have seen it used it has frequently caused serious com plications chiefly due to pressure such as sloughing of skin for example of the scalp sloughing of vessels sloughing of bowel and so forth so that healing has been greatly re tarded To say that in the situations men tioned *tubes should not be used or used* only with the greatest care so as to avoid these complications is no criticism These things have occurred and are still occurring and therein lies one reason for my choice of subject

Along with the use of drainage tubes go s usually hand in hand the fault of making too small incisions To revert to my allegory the wider the line of retreat for an enemy the quicker will he quit I do not advise sen e lessly large incisions but they should extend where possible from end to end of the abscess I would point out that in most situations it is usually sufficient to open a way freely by *which the invader can be cast out forthwith* and unless there has been great local destruc tion nature will do that successfully without much aid If local destruction has been severe as in the case for example of a car buncle the surgeon can prove a valuable ally by encouraging the separation of sloughs in various ways Even if the general resisting powers have been greatly enfeebled the free riddance from the field of the main ma s of the enemy will enable the defender to recuper ate quickly and to clear out the remnants which may be lurking in odd corners all the quicker if wise help be given by his ally in supplying what he lacks The combatant

who has borne the burden and heat of the fight is usually capable of making a final effort and should get the credit and honor of putting in the finishing blows If he does things will usually settle down better afterward The well meaning but often too brusque methods of a fresh ally may do damage to friend and foe alike and are re ented afterward

If the tissues have had enough vitality to form an abscess or even as is manifest so often for example in the peritoneal cavity if they have enough vitality to create a de cided reaction in the presence of spreading infection I maintain that nature will bring about cure more rapidly without officious help from us provided we facilitate or better still actually bring about the free removal of deleterious material including of course the cause of the suppuration

During the formation of an abscess the tissues elsewhere are busied in production of antibodies When the tension inside the ab scess cavity is relieved fluid laden with these antibodies exudes into the cavity At the same time local resistance is raised because the local circulation in the previously com pressed tissues of the abscess wall improves If the incision is large enough to provide free exit of noxious material hitherto confined in the abscess and if there are no pockets in the cavity wherein stagnation may occur the ab cess will heal rapidly without further attention if the lips of the incision are pre vented from uniting prematurely If they do adhere exudate will accumulate in the depth When it stagnates it is apt to lose its antitoxic property in contact with organisms and then it forms good pabulum for their growth Usually however such incisions gape Dressings should be so built up around the incision that direct pressure over the gaping cavity is avoided because such pres sure will itself lead to retention In certain cases the uperficial in ertion of a small strip of rubber dam is nece sary Klapp s suction glas es are sometimes very helpful in removing thick pus and promoting the flow of curative lymph The evil results which may attend the expres ion of pus through a mall opening by forcibly queezing the tissues surrounding an absce s are so well known that the procedure has only to be mentioned to be con demned

If as I have already said stagnation of the exuding plasma or lymph occurs the anti toxic substances in it are used up in neutraliz ing organisms and their poisons which are almost certainly present in the abscess wall for some time after the cavity is opened The inert fluid then forms an excellent pabulum for the resuscit tion and growth of any re maining organisms with the result that in flammation persists or recrudesces possibly in a modified degree and may spread Therefore in some deep abscesses especially in muscular parts the use of artificial drainage even by tubes may be compulsory In ordinary cases however the comparatively unyielding drainage tube really defeats its own purpose It provides recesses in which stagnation occurs it prevents active phago cytes getting at organisms which thrive in these recesses it exerts deleterious pressure on tissues which are already in a precarious state and as previously mentioned may even cause sloughing thereof In the treatment of war wounds Sir Almroth Wright introduced the use of hypertonic salt solution to act as a lymphagogue and to stimulate the flow of anti toxic plasma to the inflamed part Where there is excessive swelling and œdema around an abscess indicating that the invading organisms are probably being fought deep in the abscess wall I believe that there is no better method of reducing such inflammation and paving the way for rapid cure than by using what was known during the war as the salt pack i e by carefully filling the ab scess cavity in every part with good absorb ent gauze *in the folds of which* are evenly distributed tablets of salt These are slowly dissolved in the exuding plasma and keep up to a usually requisite extent and for sufficient time the supply of hypertonic saline solution The gauze conducts the exudation to the sur face where it is absorbed by superficial dre s ings and thus maintains the flow of lymph in an outward direction

Many years ago I used similar treatment in cases of extensive peri articular abscesses with great satisfaction to both patient and surgeon The abscess cavities were laid open

from end to end and after clearing away pus and sloughing material they were carefully and equally packed with gauze Antiseptic dressings were bound over this packing After 3 to 6 days the gauze pack was found to be so slack that it almost fell out of the wound Any loose sloughs were removed The wound was then sutured firm support ing dressings and splints were applied and healing took place by what has come to be known as delayed primary union This treatment had its corollary in the treatment of war wounds by delayed primary suture That is in cases of wounds in which it was doubtful whether excision had been success ful in getting rid of infection the wounds were packed or treated by Carrel s method and then if clean and free from inflammation after several days were stitched up

In a few cases of abscess for example in the calf of the leg I have adopted Willems treat ment with satisfactory result That is after free incision I have encouraged the patient to use the limb voluntarily so that the pressure of the actively contracting muscle squeezes out pus from the depth and prevents stagnation As you know Willems of Belgium introduced this treatment during the war for cases of suppurating arthritis

I may be permitted to run over in some detail the actual treatment which I now carry out in certain other suppurating condi tions Let us consider first and as a type of intra abdominal suppuration that very com mon disorder acute appendicitis and its im mediate sequelæ abscess and spreading peritonitis For the sake of brevity I propose to deal only with the intra abdominal condi tion In such cases I make practically al ways a right paracentral incision five or six inches or even more in length a good inch distant from the mid line and I displace the whole of the rectus muscle outward The posterior sheath of the rectus and the peri toneum are opened in the same line and extent as the skin incision Through such an incision I can *see* what I do I do not care to grope blindly inside the abdomen in such cases Under careful retraction of the abdominal wall I find out what the conditions inside are If there is merely an inflamed or gangrenous appendix without surrounding pus or spread ing peritonitis it is removed in the ordinary way and the abdomen is closed forthwith

Let us suppose an abscess surround the appendix I pack dry gauze prepared in long broad strips several layers thick around the area so as to protect the uninfected general peritoneal cavity The parietal peritoneum is pulled up by forceps fixed around its cut margin so that it helps to protect the raw surface of the abdominal wound from con tamination I then open the abscess cavity freely and dispose of the foul pus within it by suction and careful swabbing The walls of the abscess are carefully wiped dry and temporarily packed with gauze The appen dix is freed from adhesions and removed in the ordinary way The gauze is removed from the abscess cavity It is usually by this time more or less moist with exudation When I see this I feel sure that the patient will not succumb to his intra abdominal condition He may die from pneumonia embolism or other non abdominal complications If the gauze smells the cavity is packed again for a few minutes The pack is again removed the surrounding parts are meticulously cleansed possibly with moistened swabs and if there is no hæmorrhage the peritoneal cavity is closed completely

If spreading peritonitis is present the procedure is similar It may be necessary to enlarge the incision in order to obtain free access and supervision In these cases foul pus is usually found in the pelvis or along the right flank If a large amount of fluid is present it should be sucked out failing which it should be absorbed at once by strips of gauze placed loosely in the pelvis or flanks The bowel covered by gauze in the meantime should be retracted preferably by the hand When excess of stinking pus has been removed thus the foully infected parts should be gently cleansed by swabbing with pads of gauze Dry gauze strips are then packed into these infected areas The appendix is freed and removed The same procedure of re packing with gauze as already described is carried out until the exudate moistening the gauze i found to be free from foul odor or very nearly so Any large excess of *non* smelling

pus is soaked up gently Adherent flakes of lymph are not interfered with Loose flakes are removed The peritoneum is then completely closed I usually place a rubber dam drain at each end of the wound reaching to the preperitoneal tissue in case the newly cut tissues have been infected

When these procedures are carefully carried out it is extraordinary how well the peritoneum deals with such infection as must of course be left inside the abdomen I have never regretted not draining in such cases Absorption occurs so rapidly in the peritoneal cavity that postoperative accumulation of plasma is a very rare event provided no source of irritation remains Since the war I have almost invariably regretted the use of intraperitoneal drains I and my assistant have treated several hundred cases of acute appendicitis in my ward in Aberdeen since the war We have felt compelled to resort to the drains in about 1 in 14 cases The mortality in the drained cases was 9 per cent in the undrained cases 5 per cent The two conditions which make me feel I should use drains are (1) persistent oozing of blood from the surface of an abscess cavity and a condition of the patient necessitating rapid operation and (2) a shaggy irregular lining covering the surface of the abscess

I have repeatedly left small areas covered by gangrenous looking membrane when I have judged that the discoloration affected practically only the peritoneum These cases recovered without complication

During the after treatment of the cases I drained I have had much anxiety Prolonged stinking suppuration sometimes with secondary abscess formation elsewhere fæcal fistula septic pneumonia etc have complicated convalescence I believe that non drainage of the peritoneum prevents such complications to a large extent Suppuration in the abdominal wall alone is usually of short duration I believe further that intestinal trouble in the shape of partial or complete obstruction is much reduced in frequency The irritation caused by a tube or other drain inside the abdomen tend to the formation of dense adhesions which may subsequently lead to serious trouble If the results obtained without the use of intra abdominal drains are as good as or better than those obtained with the use of drains as I assert from experience that they are why use drains?

Intra abdominal drains do not drain the abdominal cavity except the small part which they themselves are irritating The rest of the cavity is quickly shut off by the formation of adhesions I have often observed this gluing together of contacting peritoneal surfaces even before operation was finished

Since a drain provides direct communication from the surface with tissues in the depth it is obvious that infection may gain access from the exterior along this track Therefore when a drain is used for any length of time it is more than advisable to use antiseptic dressings rather than inert plain gauze or wool I should think that all of us have seen the following phenomena when drains have been left in an appendicular abscess for longer than a day or two For the first 2 days the discharge is 'sweet and fairly clear It then becomes more and more purulent and smells as did the foul pus in the abscess cavity In 4 or 5 days the pus has become brownish like fæculent material making one suspect that a fæcal fistula has formed Usually by the end of 8 to 10 or 12 days the discharge is free from odor and rapidly becomes sero purulent when the drain may be withdrawn This course of events is in my opinion entirely due to the presence of the drain which stimulates a recrudescence of the activity of the micro-organisms which were the cause of the primary inflammation I have already explained why this happens

The experience of surgeons who did much abdominal surgery at the front during the war was such that they ceased to use drains Their results in saving life and preventing complications were improved when they did so

Remarks similar to the foregoing can be applied in cases of peritonitis from other causes such as perforated ulcer or pneumococcal infection

Briefly stated the plan I adopt in all such conditions is to deal thoroughly with the primary cause of the trouble remove carefully secondary deleterious matter which may

have formed in or found its way into the abdominal cavity and close the peritoneum without drainage

It was very interesting to note that during the war specialists in cranial and cerebral surgery went through a very similar experience At the beginning of the war small credit was given to the powers of the brain in recovering from injury in the presence of sepsis Some wonderful methods of draining wounds of this delicate structure were used For example I have seen tubes of perforated metal half an inch or even more in diameter inserted deep into the brain along the track of the wounds in order to try to prevent or eradicate infection and also to do away with cerebral œdema which was thought almost inevitable in such cases This really proved a very certain way of promoting the development of these evils which were meant to be avoided More rational treatment prevailed before the end of the war and followed the lines which I discussed in connection with peritonitis The primary cause of the trouble was dealt with the missile if it were still present was removed if possible secondary deleterious matter in the shape of fragments of bone pulped brain and blood clot were removed by various methods and a drain was inserted down to but not into the wounded brain Of course as a preliminary the wounds of the scalp bone and dura were excised The results of this treatment showed wonderful improvement on that which involved the use in the brain of crude artificial so called aids in the shape of drains and irritating antiseptics If the patient survived in spite of these aids he did so with a large amount of scar tissue in his brain and scar tissue there is a thing to be avoided

It is recognized by most surgeons who have studied the matter that it is wellnigh impossible to drain such a complicated joint as the knee by ordinary methods The ultimate results of treatment of wounds of the knee at the beginning of the war were appalling At a meeting of French and British Surgeons in February 1915 each speaker told practically the same dreadful story Very few successes were recorded Death or amputation (often followed by death) was the usual sequel of the various treatments employed Later on improvement followed excision of the wounded parts both of soft tissue and bone removal of the foreign body and other deleterious matter and drainage down to but not into the affected synovial cavity Then Willems the Belgian surgeon came into the field with the startling and novel suggestion that the only way to get rid of pus inside a joint was to make the patient pump it out by his own efforts He discarded drains in the wounds altogether Passive movement was no good it was probably harmful During voluntary movements the muscles tendons and aponeurosis round the joint effectually obliterate potential cavities by their pressure so that there is no room for any extraneous material If there is free exit for pus it is squeezed out Furthermore these movements stimulate the circulation of the joint so that the flow of autogenous antitoxic serum through it is increased Stagnation is not allowed

I saw many of Willems cases and the results were certainly impressive I have since then employed this method of treatment with success in civil practice It is so much opposed to that to which we have been educated that many difficulties present themselves Its novelty and our innate conservatism tend to make us postpone its application too long It should be applied at once when we are certain that such procedures as aspiration or washing out the joint are insufficient The more acute the infection the earlier should the treatment be carried out In the case of the knee lateral incisions are made between the patella and edge of the condyle about 2 inches in length freely opening the joint The patient must be encouraged in every way to make voluntary movements immediately on recovery from the anæsthetic and to repeat them frequently during the days following He should be made to walk as soon as possible Nurses and indeed all concerned must create such an atmosphere that the patient will put forth every effort After the first couple of days the pain caused by movement gradually lessens A loose antiseptic dressing to soak up discharge and to prevent access of sepsis from without is fixed over the wounds It must not interfere with movement

This method of treatment obviates the use of extension apparatus The repeatedly altered position of the joint prevents undue pressure falling on circumscribed opposing parts of the softened articular cartilage continuously so that erosion of cartilage is avoided

The last region to which I shall refer is the thorax During 1915 and 1916 I acted as consultant in an area of France which comprised from 20 000 to 25 000 base hospital beds During a period of 15 months I saw not more than ten really serious wounds of the chest We had patients in ghastly abundance who had limbs or pieces of skull or even abdominal wall blown away but only very rarely did men arrive who had gaping wounds of the chest wall In our ignorance we looked upon chest wounds as cushy injuries We saw only comparatively simple ones caused by through and through bullets or small lodging missiles When I went up to the front to act as consultant surgeon to the Third Army I realized why serious cases of stove in smashed ribs with lacerated open wounds of the chest wall and injured lungs did not reach the base Practically all of them died To show you what a sacrifice of life was entailed I quote you statistics of this type of injury in the Third Army during the battle of Arras in April 1917 In 1 month 1 500 patients with chest wounds were admitted to the casualty clearing stations of that Army Of these 500 one third were of the serious type which we had not hitherto seen at the base hospitals Remember this number concerned only 1 month of the war period and only one army out of the five British armies in France

The development of thoracic surgery during the war was the result chiefly of two methods of treatment of which no drainage was one Quite early in the war it was found that open or sucking wound those in which a free communication was established with the pleural cavity were accompanied by great respiratory distress until the hole in the chest wall was closed either by gauze packing or by suture When this was done the relief of respiratory distress was almost immediate and the patient s condition rapidly improved in other respects also Of course this procedure was adopted as a first aid to enable the wounded man to bear transport more successfully It was in 1917 that the operative surgery of such wounds was chiefly developed It was found that patients had to be operated on as early as possible after admission to the casualty clearing stations otherwise they rapidly succumbed The lacerated soft tissues and bone of the chest wall were excised the wound of the lung was attended to foreign bodies were removed the pleural cavity wiped clean and the chest wall closed without drainage Discarding of drainage made all the difference to the mortality rate Some surgeons who adopted the procedures I have detailed sent down the line as many as 70 per cent of the cases they operated on and these cases showed every prospect of becoming useful citizens Later events prove that they have done so It was one of the bright spots in the surgery of the war No drainage was probably the chief contributory cause once the wound had been cleansed by excision of lacerated and infected tissue It was found that collapsed lung expanded in an incredibly short time Even in 24 hours it might be impossible to tell by auscultation alone which side had been operated upon All that was necessary after operation was to ensure that fluid did not collect in the pleural cavity therefore for diagnosis an exploring syringe and if necessary an aspirator was used every day or second day until no fluid could be demonstrated

The success which attended the treatment of these infected thoracic wounds of war has already stimulated many to apply the same principles of treatment in civil life with conspicuous success in some cases

In certain cases of empyema for example it has been shown that convalescence has been made much shorter and easier for the patient In these cases the chest has been laid open freely usually by resecting a long piece of rib adherent lung has been freed the pleural cavity carefully cleared and the wound closed without drainage Want of success in some cases treated in this manner may be due to faint heartedness in procedure and in others to selection of the wrong time for operation Why should some cases heal without trouble while the wounds in others

break down or the pleural cavity have to be re opened? We must remember that the conditions in the thorax differ widely from those in the abdomen When the matter is viewed from our old standpoint that the great indication in treatment of inflammation is to give an inflamed part rest it is very evident that the abdomen has the advantage over the thorax One can get along quite well for a few days even though movement in the intestine does not occur but the heart *must* beat and the lungs *must* be inflated periodically in order to maintain life War surgery has shown that recovery may be very prompt in spite of such movement In certain types of infection rest at one time or other of the development of the resultant inflammation may be essential for cure For example from *clinical observation alone I should judge that* resistance in a streptococcal infection requires a longer time to develop successfully so that the inflammation becomes localized than it does in the case of a staphylococcal infection

Therefore for combatting a streptococcal infection conditions must be very favorable Pleural effusion may be looked upon as a wise provision of nature in such cases It limits the amount of movement especially of the lung and thus may turn the scale in favor of success One may further suppose that if in the general mechanism of resistance to infection the circulating plasma has not been filled with appropriate antibodies it is of little use to withdraw fluid from the chest at this stage *The infective process may still be in* full swing and as it will still stimulate exudation any radical interference may result simply in the provision of nutrient material which is more suitable for the growth of organisms than was the more or less inert fluid which was removed The influenza epidemic which occurred toward the end of the war furnished numerous cases of pneumonia accompanied by acute empyema due to streptococcal *infection There was much* evidence to show that such empyemata did not respond satisfactorily to the ordinary pre war treatment by immediate drainage The experience indicated that it is not always wise to make an immediate vigorous attack on the pleural cavity when acute suppurative inflammation is diagnosed It is wise to ascertain the type of infection present All the same it may be necessary to remove enough fluid to relieve threatening symptoms caused by pressure on the heart or mediastinum In a day or two the resistance may be so increased that radical measures will be successful Examination of the blood constituents may help us to decide when to interfere

It is *different* in the abdominal cavity If rest is necessary then when the focus of infection and the accompanying deleterious matter have been removed the quiescent sometimes paralytic state of the intestine provides rest while the wonderful powers of absorption of the peritoneum will likely prevent accumulation of nutritive fluid for development of any remaining infection

In view of these considerations you may appreciate my hope that with increased knowledge and scientific application thereof it may prove in future that drainage of the pleural cavity may be dispensed with as safely as drainage of the abdominal cavity is at present

I hope that I have been able to show you that the same type of treatment can be applied successfully in apparently widely differing disorders When this is demonstrated then it can be said that definite principles have been established The main idea of a principle must be right It remains for us to improve the application of the principle

DEPARTMENT OF TECHNIQUE

REPEATED VENESECTION–BLOOD TRANSFUSION IN ANURIA

Report of a Case of Acute Nephritis with Anuria

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DURING the past 27 years surgical thought and endeavor have been applied to many cases of nephritis and to one of its most serious complications namely anuria Operative measures employed after medical treatment proved unavailing have been attended with failures in some instances with the prolongation of life from a few weeks to several years in others and with reported cures The percentage of the last two mentioned was sufficiently high to justify a classification of the treatment of nephritis into medical and surgical The former usually consists in the administration of such measures as will induce (1) diaphoresis (2) diuresis (3) catharsis (4) alkalies to combat acidosis if present and (5) venesection The surgical procedures advocated are first the removal of causes if such be found that give rise to mechanical obstruction and reflex inhibition of the urinary outflow e g stones phimosis blood clot etc the treatment being carried out by operative intervention or cystoscopic manipulation as indicated second decapsulation nephrotomy or a combination of the two third blood transfusion and last planchnic anæsthesia

We desire to report the use of an additional surgical method i e the combination of repeated venesection transfusions in a case of acute nephritis with anuria

In addition to decapsulation of the right kidney (which was unsuccessful in producing any immediate beneficial effects) the patient was bled 500 cubic centimeters and was then immediately transfused with an equivalent amount of blood from a healthy donor The criteria that determined the frequency of this procedure were based on the clinical condition of the patient the blood chemistry findings and the amount of urine excreted in 24 hours It was found necessary to use four venesection transfusions

Anuria may be physiologic as best is (Kappeler) in fi

HISTORY OF CASE

L S a white boy age 11 was admitted to the medical service of the City Hospital July 9 1923 in a mild state of pathy complaining of severe frontal headache and of acute dull pain in the right lumbar region It was stated by the parents that the patient had been urinating during the past 6 days suppressing decreasing shortly after the occurrence of infected circumcision of the finger which was incised and drained The physician returning on the second day found reduced partial phimosis (Fig 1) and with the manipulation previously the patient had always been healthy and well except during an attack of typhoid fever when 8 years of age

Physical examination The patient presented the appearance of a well nourished and well developed boy who seemed not acutely ill On admission to hospital temperature was 36 7 degrees C pulse 80 respiration 20 blood pressure 110-40

A small infected wound of the right ring finger was associated with moderately enlarged epitrochlear and axillary glands the best evidence however of superficial lymphangitis

The evidences of a distended bladder in the hypogastrium on percutaneous examination When catheterizing some difficulty was encountered at the meatus due to an complete exposure from the recently acquired phimosis The passage of a soft rubber catheter revealed an empty bladder

A moderate amount of tenderness to light fist percussion was elicited only over the right kidney posterior The kidneys were not palpable

The face presented duskily a suggestion of œdema, while the ankles and feet presented slightly an deep pressure There were no evidences of effusion in the pericardial cavity Nothing abnormal to pathology could be discovered in the head neck The buccal mucous membranes were normal in color the tonsils small and of normal appearance the throat good condition the tongue moist but heavily coated Respiration was costo-abdominal in type No pathology was discoverable in the thorax lungs The contour of the abdomen was normal No tenderness or rigidity could be palpated and no masses were found The liver and spleen were not palpable dullness within the normal limit The ewing slight œdema of the ankles and feet otherwise normal The muscular reflexes were normally active

Additional data follows

1 X ray pictures of the genito-urinary tract showed normal kidneys outline the were no shadows suggestive of calculi

TABLE I

D 9 3	h ft d f t k in m.	4 h rin ry pu in m	Blood Ch m ry mg pe oo cm		Blood pres	R mark
			Ure	Creatinin		
7 3	oo				o–65	V mu ing E tur q an (salin) g bcut d in re
7 3	300		46	8 5		V miting Enth quan (sali) gi bcut d intr Bloody uri
8–	300	3	95	5	30–8	*Dec p nlo son* E quan (pe t gl cose) giv Intra Bloody in f om th
8	500	5	3 9	5	30–85	N vomiting ½ f his qu wa sal f tra th half fl d by mouth *Venesec son to nsf to*
8–3	87	5			32–78	Fluid by mo th fy od was re ained. Blood uri
8 4	5	5	8 75	9	38–8	Fl id by m th only and was retained Bloody rin *Ven or fus on* Findings h ur befor proced Findings on h f proced
8 5	000	35			32–78	N omiting All fl id by mouth Bloody rin Drows e disapp
8–6	600		64	43		Vomiting headach drowsiness re urning Although m h fluid was given ly 600 bic time ra tained
8–7	600				34–78	V miti g headach d ow ss ret rn g Although m ch fl id was gi en ly 6 bic umet rs re l ed Sl bloody An rin 8–6 pbly refl
8–8	000	35			37 79	Sl emes Sl bloody rine *Ven ection nsf on.*
8–9	500	500			39–78	Sensorium lea Irritabil nd estlessness disappearing
8	000	35	7		6–8	Se sori m clo dy Œdem f ankles fee and ac um
8	6	35				Sensori m l dy Œd m f kles f t d scrot m *Venesec on nsfus on*
8–	984	700				Se so m ga el Does sleep b t ge 'l dit Improv
8– 3	000	90			48–88	Sensorium gai lea Does t sl p b t ge 'l di Improv
8 4	000		75	6 9	55–95	Senso um gain clear Does l p b g 'l di Impro
8 5					44–7	Sl pa t i ervals. Œd m d pp
8– 6	oo					V m g Irritabl N drows esa
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8– 8	000				o–76	Sl pa ll Appe poo
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U ea

2 N b truct was ff ed to th passage f a No 6 F cy toscope wh ch e l d rmal bl dd w th normal t ral rifice The ret rs w e t th t rized 3 D H Shar tte di g ophth lm l gi t e am ed th ye g ds d port d n rm l findings

T bl II d III h w Labo t ry D ta

Oper tio I i w f the f t th t c nserv ti e t at m t f ½ d ys had ca d ab tem nt f u æmu ympt ms d th t th w n cr asi g acc m lati of e d c e t m e th blood ce dru o the p t t w s tra f red t th gical d A gu t 9 3 wh n d ap lat f th right k d y as p f rmed der g l local æsth ia At pe t n d rabl œd m f th peri l tis s f und the tru c p le w t u d t s d was dh nt t two th po t alo g th con x bo d th kid y ppe ed ormal n siz d k l d eparat d c fl nt hæm rrhagic r s w e v s ble th rf c f th rga Th fibro s capsule was tripped d wn to th pedi l both s d s a d cut way Th al cl re f the wou d w m d A dorsal sl t f the nflam d prep e a m d d dw lli g cath t nserted in th bl dd

VENESECTION TRANSFUSION

Through a personal communication with Dr H L Sanford we obtained information concernin a case of bichloride of mercury poisoning which had come under his observation and care at the St Alexis Hospital in May 1923 The patient a woman of 22 years had an anuria which lasted 48 hours during which time the routine methods of inducing an excretion of urine had been employed without avail Repeated venesection transfusions were then resorted to following the first of which there was an appearance of urine in small amounts

TABLE II —URINE EXAMINATIONS

D t 9 3	Sp gravity	Albumi	W B C	R B C.	Casts
7 3	m ff qua	++	+++	++++	Ma y gran la Few hyalin
8–2	insuff quan	++	++	++++	M y gra la F w hyaline
8–4	ff quan	++	++	++++	Many gra ula F w hyalin
8–5		++++	++++	++++	M y ell lar
8–7	6	++++	++++	+++	M y llula
8– 6		++++	+++	++	F w llula
8– 5	6 6	++++	+++	++	N
8		++++	+++	++	N
9–1		+++	+	++	Oc as hyal
9–1	5	++	+	++	N
9–3		+++	+	++	N
9–9		++	+	+	F w hyalin Few granular
9–		++	+	+	F w hyalin F w gra l
9–		+	+		F w hyalin F w gra la
9– 4	3	+	+	+	Few hyali F w gran lar
9– 8		+	+	+	Few hyalin Few gran lar
9–2	6	+	+	+	F w hyaline Few granular
9–		++	++	+	Occas hyal.
9–19	5	++	+		F hyalin Few gr ula
9– 3		++	++		F w hyalin F gra la
9–27		++	+	+	Occas hyal
–2	8	++	+	+	N
–9	6	+++	++	+	N
4	5	+++	++	+	N
t	3	+++	+		N
–27	7	+++			Non
	6	+++	+		Mod no hyal.
2–		+++			Non

+= s t ll pe low po fi ld
++= ll pe low pow fi ld.
+++= t 3 lls pe low po fi ld
++++ 3 and bo ells pe l w po fi ld.

during the ensuing 24 hour a definite amount of urine (no measurement recorded) was obtained from the bladder by a catheter and it is certain that the amount of urine increased rapidly until the time of the patient s death which occurred on the eighth day after admi sion It was impossible to estimate the exact amount of urine since it was lost at the time of defæcation as many as 15 to 20 bowel mo ements being noted per day

TABLE III A —PHENOLSULPHONEPHTHALEIN

D t 9 3	h t	d hr	3 d h	T tal
0–4	38	35	5	45 53 60
3				

TABLE III B —MOSENTHAL TEST

D	Hou	Sp gra
	8 M	6 7 8 8 8 5 6
t	4 6 8 P M ht	

TABLE III C —BLOOD EXAMINATION

D 9 3	7–29	8–	3
W B C	4.4	6 000	7
R B C		4 800 000	3 000
Hb (Talqv)	90	85	7

TABLE III D —ESBACH

D t	Gms lb pe pt
0–5	6
–2	65

Blood W assermann pega ve
Blood C ture ga ft 7 hours

With a knowledge of Dr Sanford s experience in the above instance and of the observations of Robertson and Boyd in the treatment of toxæmias of severe burns by means of exsanguination transfusion we were led to the adoption of repeated venesection transfusion in the case here reported

In Table I the chemistry figures shown on August 4 19 3 were from samples taken 1 hour before and 1 hour after venesection transfusion there being a drop of 53 milligrams of urea and 1 milligram of creatinine per 100 cubic centimeters of blood immediately afterward This lowering was however temporary since on August 6 1923 a marked accumulation was found Following the last (fourth) venesection transfusion the urea and creatinine continued to diminish until almost normal figures were obtained 3 weeks later It was also noted that following each of the four treatments there was an immediate and complete disappearance of all uræmic symptoms lasting from 12 to 48 hours

In regard to the excretion of urine the following was noted (1) After first venesection transfusion 145 cubic centimeters in the ensuing 24 hours

(2) after second venesection transfusion 100 cubic centimeters in the ensuing 24 hours (3) after third venesection transfusion 150 cubic centimeters in the ensuing 24 hours (4) after fourth venesection transfusion 350 cubic centimeters in the ensuing 24 hours

BLOOD CHEMISTRY

V C Myers states that those cases in which the creatinine had risen above 5 milligrams per 100 cubic centimeters of blood rarely showed any marked improvement and almost invariably died within a comparatively limited time The only exceptions were cases where the retention was due to some acute renal condition The highest blood creatinine with ultimate recovery observed by Myers occurred in a patient developing anuria following a unilateral pyelogram and displacement of a renal calculus This case was reported by McCarthy (14) the creatinine content reaching 5 1 milligrams per 100 cubic centimeters

Feinblatt found that in 14 patients attaining figures of 10 milligrams per 100 cubic centimeters or more all died within less than 3 weeks the average length of life after reaching this figure being 4 days and that of 15 patients who yielded figures between 5 and 10 milligrams 11 died uræmic within 17 days the average being 6 days He cites two cases to emphasize the fact that with a retention of creatinine exceeding 5 milligrams the prognosis as regards the renal condition while grave is not necessarily hopeless

In the case under our observation the highest blood creatinine content was 11 43 milligrams per 100 cubic centimeters with recovery as far as life is concerned thus far (7 months) but with a residual chronic nephritis

VENESECTION

It seems quite obvious that any benefits resulting from one or two venesections would not only be exceedingly fleeting but would also be overshadowed by increasing anæmia which is usually already present particularly if the procedure were employed a greater number of times

Rost quotes Becker in that his experiments have shown that venesection does not constitute a detoxifying process on the contrary the amount of retained nitrogen in the blood as well as in the tissues increases The statement that is frequently made viz that dilution of the toxins and washing out of the tissues take place is therefore incorrect

DECAPSULATION

That the true capsule of the kidney offers an impediment to a new vascularization (Debohls conception in chronic nephritis) need not be taken into consideration in an explanation of the results obtained in acute cases since it has been noted that the urinary flow begins and increases either immediately in the ensuing 24 hours or 36 to 48 hours after operation

In regard to the modus operandi of decapsulation in effecting diuresis in acute cases several explanations have been offered some of which are as follows

1 It relieves congestion by permitting the kidney to expand Simulation of the tension is made to that in glaucoma of the eye by Harrison who first reported on the surgical treatment of acute nephritis in 1896 obtaining beneficial results by kidney puncture

2 The capsule being under marked tension constriction of the vessels at the hilus results This may be a factor in addition to the nephritis in causing renal circulatory stasis Incision and stripping of the capsule not only releases the pull on the vessels and the intrarenal tension but the necessary operative manipulation according to Lloyd is attended by an abstraction of more or less blood from the organ while following operation the flow of serum probably still further decreases congestion

3 In a complete stripping operation the nervous mechanism of the kidney particularly at the hilus is partially or completely damaged thus leading to an increased flow of urine This theory is based upon the fact that section of the splanchnic nerve in animals causes a polyuria Neuwirt blocks the splanchnic nerve with local anesthetic in conditions of reflex anuria and oliguria in man claiming the same effect as when the nerve is severed

Fitzbischoff quotes Jaboulay to the effect that the changes arising in the renal circulation after decapsulation may be attributed to a stretching of the sympathetic nerve fibers in the pedicle and that Albarran performed a total decortication in order to enervate the kidney as completely as possible This conception is however questionable

Post in a general review states that although decapsulation has yielded good results in some cases of anuria yet it is not astonishing to read of failures many of which can be attributed to kidneys previously the seat of irreparable pathology (marked hydronephrosis cystic disease old contracted kidneys etc)

Sanderson Wells states that decapsulation is an emergency operation in anuria and although from the physiological and pathological standpoints the outlook appears disappointing from the clinical aspect the results are quite different

Eppinger Kummell and other observers hold that no cases of acute nephritis should be deprived of the chance decapsulation may offer as to prolongation of life after medical treatment has proven futile

COMMENT

From a purely scientific viewpoint we regret that both decapsulation and venesection transfusions were used leading to possible confusion as to which procedure effected the result Clinically however upon being confronted by such a desperate case we felt it only justifiable not to omit decapsulation

A question of considerable importance then is would the excretion of urine have taken place without surgical intervention and if not were the results attributable to decapsulation repeated venesection transfusions or the combination? It is an old observation that spontaneous resolution may sometimes occur in acute nephritis but one cannot deduce accurate conclusions from cases in which no blood chemistry findings were reported [1] In regard to the second question that of decapsulation we are of the opinion that at least the immediate beneficial effects of the operation can be ruled out since the kidney was normal in size there was no tension on its capsule and only 10 cubic centimeters of urine was excreted in the ensuing 24 hours Concerning the remote effect of decapsulation (which is said to begin about 10 days after operation this is spoken of by Edebohl in regard to chronic nephritis) it will be noted (Table I) that on the eleventh day after operation 700 cubic centimeters of urine were excreted and from that date onward there was a continuous rise reaching as much as 2 500 cubic centimeters of urine per day 3 weeks after decapsulation It should be noted however that venesection transfusion performed on the tenth day after operation because of the high blood figures and of uræmic symptoms resulted in a definite and marked relief of the latter There seems to be general agreement that the beneficial effects of decapsulation are immediate i e not longer than 48 hours Therefore there remains considerable doubt as to the late effect of decapsulation in this instance

In perhaps a somewhat analogous sense as colostomy jejunostomy etc are at times lifesaving measures in acute intestinal obstruction employed to prevent an absorption of toxic bodies by diverting the alimentary stream may we not consider the use of repeated venesection transfusions similarly in acute renal damage as effecting a direct definite but temporary intermittent diversion of nitrogenous waste and toxins by way of the blood stream and indirectly through the blood stream by possibly stimulating the excretion of urine?

CONCLUSIONS

1 Repeated venesection transfusion is a logical procedure in acute conditions interfering with the permeability of the kidneys in that it lowers the amount of accumulated catabolic products in the blood not only by frequent removal but also by repeated dilution of the remaining circulating blood

2 It is a more logical procedure than a single venesection transfusion since it is inconceivable that the tissues could be detoxified for a sufficient length of time to admit of much benefit

3 It tides the patient over a critical period until the kidneys can again resume their function

4 It can be used as an accessory measure but should not supplant renal decapsulation which is a recognized useful procedure in nephritis

5 The frequency and number given in any case should depend upon the clinical condition of the patient the blood chemistry findings and the quantity of urine excreted in 24 hours

6 We ascribe an important rôle to repeated venesection transfusion in the recovery of our patient since there was no tension that could be relieved by decapsulation and no diuretic effect was obtained following the operation

Realizing that no far reaching conclusions can be deduced from observations in a single case nevertheless we thought it of some value to record our findings and we shall view with much interest observations by others who might choose to adopt the procedure herein described

The blood chemistry was performed by Doctors Ralph H Ming and Clarence M Hyland

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LOOSE BODY IN KNEE JOINT DEMONSTRATED BY PNEUMARTHROSIS[1]

By IRVIN BALFNSWEIG BS MD New York
Clin l Ins t Orth r d re ry C m ll U rs Med cal C lleg As t S ge Hosp tal f R pt red d C ppled O t P t t
D na tme Assista Vis g S rgeo C y Hosp l

THE injection of oxygen or other ga es into joints for diagno tic purpo es i not a new procedure but one that i not u ed as often as it hould be Its greatest u e i in the doubtful cases of internal derangement of the knee joint Negative X ray findings need not deter one from attempting further ob ervation or operation The procedure i harmless in so far as it does not cause much pain i not a disabling one and there i no resulting joint traumati m There have been no complications noted to date at the Hospital for Ruptured and Crippled where some forty joints have been inflated

The method u ed i as follows

The patient may be given a small do e of morphine o minutes before operation and the part i prepared in the usual manner A 3 inch sterile needle i in erted into the joint from either the medial or lateral a pect avoiding the fat pad and whatever fluid is found to be present i with drawn with a syringe Sterile rubber tubing i then attached to the needle and to the tank con taining oxygen The joint is then gradually dis tended until the patient complain of tightnes and pain when the X ray pictures are taken in both the anterior and lateral planes When thi i done the rubber tubing i detached and the ga i forced out of the joint by bi manual manipula tion The part i then dres ed and a gauze bandage applied there being no need for any immobilizing apparatus

CASE REPORT

A B schoolbo age 16 presented himself at the clinic of the Ho pital for Ruptured and Crippled December 13 19 3 complaining of pain and oc casional lockin of hi left knee He was well up to 1 year ago when a schoolmate approached him from behind striking him across both knees thus causing a sudden flexion of knee joints He fell forward and struck the floor On ari ing it was impossible completely to extend the left knee joint Thi persisted for 1 week and was accompanied by swell ing He has since then never been free from an occasional failure to extend the joint and has pain hen exerci in For the past 3 months these at tacks have become more frequent as many as two and three times a day lasting for a few minutes The pain hift from side to side and together with it a snapping sen ation is felt

Exami ation The patient is a well developed o ernourished and rather obese young white male eight 169 pound He presents a light double knock knee deformity and double weak feet Locally the left knee i somewhat swollen There is no re striction of motion no pain and no point of tender ness nor any evidence of locking or snapp ng The left knee measures one half inch greater than the right in cir umference

Roentgen ray pictures taken December 13 1923 reveal the followin In the right knee there is no evidence of pathology in the left the antero posterior view i negative The lateral however shows the presence of small shadow of less density than bone regular in outline and measuring 5 by 3



Fig Lat ral d t post n w pn r to gr jectio







Fig 2 Lateral a d a teroposten t s f llo ing oxy g i ject

Th pa er was presen ed b fore th Orthoped ection of h Acadeni f M d ine N w Y k J ry 9 9 4

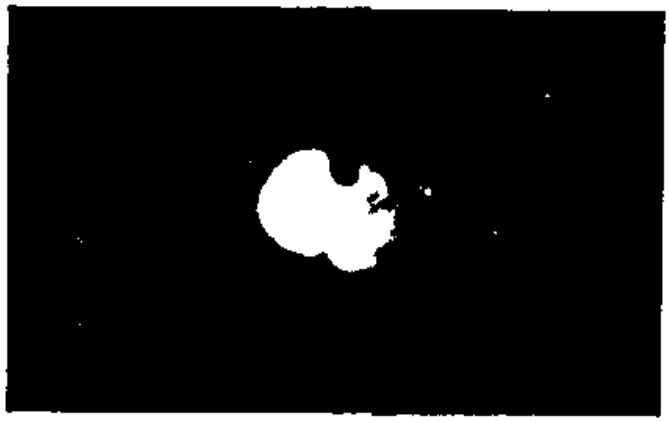


Fig 3 Photograph of specimen (natural size)

millimeters and situated 1 centimeter behind the anterior tibial border

On December 17 1923 oxygen was injected according to the technique described Before injecting the oxygen 2 ounces of straw colored synovial fluid was withdrawn The X ray films now revealed in the anteroposterior view a spherical shadow 8 millimeters in diameter located between the tibial spinous processes In the lateral view there was a similar shadow attached by its inferior pole to the upper surface of the tibia 1 centimeter posterior to its anterior border

On December 19 with the patient anæsthetized an Esmarch bandage was applied to the upper third of the left thigh A 5 inch vertical incision curved at both ends and one half inch medial to the patella was made The joint was incised in the line of the incision which extended upward between the vastus internus and the quadriceps tendon thus giving an excellent exposure About 2 ounces of brown colored synovial fluid was evacuated The synovial tissue was not thickened but was found to be discolored as a result of punctate hæmorrhages in the neighborhood of the needle insertion The medial semilunar cartilage was completely detached from the tibial border and located between the femoral condyles It was removed in its entirety On further exploration of the joint a small body as previously described was found to be attached to the tibia by a membranous pedicle at the point of origin of the medial semilunar cartilage This mass was also excised Investigation of the lateral cartilage proved it to be normal in all respects The joint was irrigated with saline and closed in layers using No 00 chromic catgut for the approximation of the synovia No 0 chromic for the closure of the capsule and the suturing of the vastus internus to the quadriceps tendon and No 1 catgut for the approximation of the subcutaneous tissues and the skin Dry dressing was applied and the patient was returned to the ward

February 7 1924 The postoperative course was uneventful the patient being allowed home on the fourteenth day walking without apparatus and but slight discomfort The range of motion now possible is from complete extension to 120 degrees of flexion Since January 7 the patient has been at school relieved of all symptoms

The pathological examination of the loose body reveals the pedicle to consist of fibrous tissue attached directly to bone at the hilus The covering of the mass is a thin layer of cartilage except at the point of attachment The origin of this body can be considered to be from a small detachment of the medial semilunar cartilage at the time of the first injury followed by hypertrophy and bone formation as a result of repeated traumatisms the blood supply coming through the pedicle

SUMMARY

The method herein described was a distinct aid in both localizing and differentiating the loose body from the surrounding tissues

INSULIN TREATMENT OF THE TOXÆMIC VOMITING OF PREGNANCY [1]

By WILLIAM THALHIMER M D Milwaukee
From the Laboratories of Columbia Hospital

EIGHT patients with pernicious vomiting of pregnancy have been successfully treated with insulin combined with the intravenous administration of glucose five of these having been reported previously [2] The report of the three additional patients follows

I am indebted to Dr F C Walter of Mayfield Kentucky for the following case report

Case 1 Mrs S age 30 a multipara amenorrhea last in November was seen by us in consultation on March 5 At that time she had been vomiting constantly for a period of 3 weeks She had been able to retain practically no food or water the time and were observed only fluids by mouth of Murphy drip Pulse 140 weak eyes sunken with yellowish tinge general condition bad Patient was brought to the Mayfield Hospital the evening of March 5 and vomited all night March 6 urine was scanty acetone 4 plus At 10 15 a m an intravenous solution of 5 per cent glucose was started was continued until 2 000 cubic centimeters had been given (5 p m) During this time 3 units of Iletin were given At 2 00 p m the urine showed marked trace of acetone At 4 00 p m the urine was negative for acetone The patient was given some orange juice and slept well all night She has had no nausea or vomiting since that time and was discharged from the hospital in excellent condition

Case 2 The patient a primipara 23 years old was admitted to Milwaukee Hospital under the care of Dr H W Hutter March 19 24 She had been vomiting for a week past and had been vomiting 12 times a day for 6 weeks She appeared moderately dehydrated Her pulse was small and weak temperature 98 4 Her urine showed 3 plus acetone and diacetic acid 1 24 hours she was given rectally 4 grams of glucose mixed with chloral bromides Her condition remained unchanged and the ketonuria remained the same The day after admission at 10 00 a m she was given 55 centimeters of 10 per cent glucose solution intravenously and every 4 hours during the day a total amount of 500 cubic centimeters of glucose were given Also At 1 p m she was given nothing by mouth At 5 00 p m acetone in the urine was 2 plus At 6 30 p m she was given 15 grains of sodium bicarbonate by mouth every hours after the beginning of the glucose infusion The following morning her urine contained trace of albumin At 10 00 a m 500 cubic centimeters of 10 per cent glucose were given intravenously during the day Her vomiting ceased The following day which was the second day after the vomiting began she vomited twice and once on the third day after the vomiting began Her urine still showed 2 plus acetone but the fourth day after the vomiting began the urine was entirely free from acetone bodies and appeared normal

The patient began to take food shortly after the first treatment and gained in appetite for occasional pellets of

Thalhimer William J Am M Ass 9 lxxx 696

omitting she continued to eat and in fact craved food and ate more than the average individual

The patient left the hospital in about 10 days in good condition and has remained so

The following report is of a patient kindly referred to me by Dr C M Echols

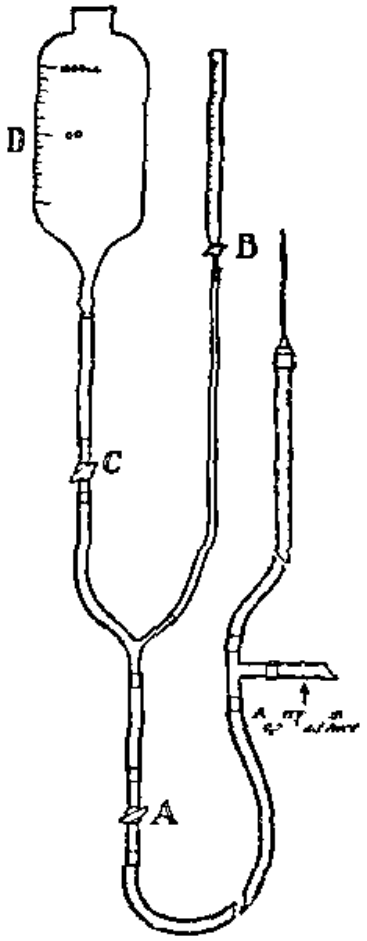
Case 3 The patient age 27 a primipara was admitted to Columbia Hospital April 1 924 at noon She was about 5 months pregnant and had had a moderate amount of nausea and vomiting during the first 3 months of her pregnancy then for 2 or 3 weeks there was none During the days previous to her admission to the hospital she had been unable to retain either food or liquids

She was in very poor condition when she entered the hospital being moderately dehydrated Her eyes were sunken and had dark rings about them The pulse was small rate 140 The urine had 4 plus acetone and diacetic acid and the blood alkali reserve (Van Slyke method) was 35 the blood sugar a 0 5 per cent At 1 00 p m intravenous glucose administration was started and in 3 hours 1 000 cubic centimeters of 10 per cent glucose was administered During the time 30 units of insulin were given hypodermically At the end of this time the alkali reserve was 48 and was 69 the following morning The patient retained moderate amount of food immediately after this procedure and slept well that night without any narcotics having required a dose of morphine every night for the 2 days before admission Five hours after the treatment was started the urine showed 3 plus acetone and 2 plus diacetic acid 18 hours later the urine showed plus acetone and 1 plus diacetic acid 36 hours after the beginning of the treatment the urine showed plus acetone and diacetic acid The patient continued to vomit 2 or 3 times a day for 3 days and after this time the urine still showed plus acetone and diacetic acid even though the alkali reserve was 67 the glucose and insulin treatment outlined above was repeated Immediately after this the urine became acetone free and has remained so The patient is now one week after admission on a normal diet retaining all of her food and is almost ready to leave the hospital

All of these patients showed marked ketonuria and one of them was proved to have a moderately severe acidosis as indicated by a carbon dioxide combining power of the blood plasma of 35 (Van Slyke method) Three hours later at the end of the intravenous infusion of glucose and the administration of insulin the blood plasma carbon dioxide combining power was 48 and 19 hours later it was 69

As previously pointed out the rapid eradication of ketonuria and even of acidosis by combined insulin and glucose therapy seems to cause relief of the nausea and vomiting in these

Read before the Chicago Gynecological Society April 8 924.



Appa t s u ed i administ n g gl co l t n

non diabetic patients A vicious cycle of acid osis causing vomiting and the starvation fol lowing the vomiting causing further acidosis of a starvation type seems to establi h itself in these patients Insulin helps break thi cycle by forcing the body to oxidize the ad ministered glucose which in turn causes the burning of the products of incomplete fat metabolism (acetone aceto acetic acid B oxy butyric acid) Thi reduces or eliminates the ketonuria the lowered blood plasma carbon dioxide combining power i raised and this removal of the acidosis eradicate the chief cause of the severe nausea and vomiting Tood is then retained and with a proper diet rich in carbohydrates nausea and vomiting (except to a slight degree in the morning) u ually does not return

Evidence i accumulating both in the liter ature and in my investigations which indicate that pregnancy itself cau es an abnormality in the carbohydrate metabolism which may be the fundamental cau e of excessive vomiting of pregnancy There are still several gaps in this evidence and I will reserve publication of the available data for another time It i possible that the acidosis found in *severe* vomiting of pregnancy is due not only to a deficient supply of carbohydrate but also to either an actual reduced ability of the mother to utilize carbo hydrate or to the excessive demand of the growing embryo membranes and uterus for carbohydrate

APPENDIX

The glucose solution is given by means of an apparatus previously described [1] The solution is prepared as follows

Sterilize at 15 pounds pressure for 30 minutes measuring cups funnels filter paper stirring rods and distilled water in flasks plug ed and covered with gauze

Measure out into sterile basins 100 grams dextrose (Merck) *highest purity C P an hydrous* (This is a special preparation and better than ordinary C P dextrose) While the water is still warm a nurse puts on gloves and is as isted by another nurse who pours the dextrose from basins and the sterile water from flasks into measuring cups to 1 000 cubic centi meters The first nurse mixe thi thoroughly filters and measures 1 000 cubic centimeters back into flasks which are plugged and covered with sterile gauze by the second nurse By having all material sterile before mixing th dextrose (the only non sterile ingredient) with the water bacterial growth is minimized

Sterilize the mixture for 30 minutes in an autoclave at 9 to 10 pound pressure Do not allow the steam pressure to go above 10 pound as carmelization takes place and the solution changes to a brownish color Only a water clear colorless solution should be used At end of 30 minutes close off all steam and do not open door or release pre ure for 10 mi utes Then open the door very slowly and carefully and remove flasks from sterilizer immediately Keep in a cool place or better in an ice box

THE ESSENTIALS OF THE INSULIN AND GLUCOSE METHOD OF TREATING PATIENTS WITH E VERE POSTOPERATIVE ACIDOSIS OR SEVERE VOMITING OF PREGNANCY

Only those cases should be treated v ith thi method which have a severe acidosis Thi should be determined first by demonstrating large amount of acetone and diacetic acid in the urine or by demon trating a blood alkali reserve of 45 or le but most of the case treated up to date have shown an alkali reserve of about 40 (the figure for a normal alkali re

erve being 60) When it ha been determined that evere acido is is pre ent 1 000 cubic centimeters of 10 per cent gluco e solution should be slowly given intravenously The time consumed in giving thi amount i 4 to 5 hours One hour after the intravenous infusion has been running 20 units of U o iletin (that is 1 cubic centimeter) should be given hypodermi cally An hour later 10 units of U 20 iletin (½ cubic centimeter) i given hypodermically No patient has ever had an insulin reaction after these do es

In ca e marked improvement of the patient s general condition and of the acidosi has not occurred in 12 hour the above procedure should be repeated and it i better never to give a do e of insulin to a non diabetic patient without at the same time admini tering a proper amount of gluco e either hypodermically or intravenously ince one can only be sure of ab orption of the gluco e when it is admini tered by one of the e two routes

While the gluco e i running the patient should not be left alone for a minute and should be een frequently by a physician and a sterile hypodermic syringe and a bottle of adrenalin should always be available in the patient s room If an insulin reaction occurs from 3 to 5 minims of adrenalin should be given hypodermically at once followed by more gluco e intravenously or by carbohydrate food by mouth

If in your clinical judgment the patient i greatly dehydrated at the beginning of the treatment give 2 000 cubic centimeters of 1 per cent glucose solution instead of 1 000 cubic centimeters of 10 per cent

RESULTS

The patient s urine becomes acetone free in about 1 hours and the alkali re erve rise about 10 points Vomiting usually either en tirely or almo t entirely cease shortly after treatment is begun A small amount of acetone usually reappears in the urine in 18 to 24 hours but if the patient is retaining food and i in good condition otherwise unles the acetone markedly increase or the alkali reserve fall abruptly further treatment i usually not necessary Carbohydrate food particularly should be given in moderately large quantitie as soon as the patient will retain it (skim milk orange juice lemonade with sugar in it tea or coffee with sugar in it gruel etc) (At first give no cream butter or fat) Give plenty of fluid After the vomiting has ceased for about 24 hours allow the patient s appetite to dictate the kind of food still bearing in mind that carbohydrates hould be prominent in the diet ary and fats should be ab ent

Blood hould be obtained for examination at the time the intravenous infusion i started if it has not been obtained previou ly Thi is important for the sake of record and ob erva tion A sample of blood should be examined 24 hours later also

TREATMENT OF INSULIN REACTION

Only one patient had an in ulin reaction As he was extremely ill he had received in her fir t treatment 1 000 cubic centimeters of 10 per cent glucose solution intravenously and 30 units of in ulin followed by an additional 10 units of insulin several hours later This cau ed no reaction The next day the treatment was repeated but 40 units of insulin were ad mini tered while the intravenou gluco e was being administered Shortly after the intra venous infusion was finished she had a definite insulin reaction She re ponded immediately when 3 minims of adrenalin were given hypodermically and 2 glasses of milk were given by mouth Although she had been vomiting she retained all the milk

WRIST UNDER CHIN A CAUSE OF DEFLECTION MANUAL ROTATION IN DEEP TRANSVERSE ARREST

By GEORGE EDWARD BARNES B A M D Harrison New York

On October 10 1923 I attended a case of labor in which I made an observation on a cause of deflexion attitude which so far as I know has never before been made

During the last two weeks of pregnancy the child's vertex rested on and slightly to the pelvic brim occiput to left transverse Early in labor a manual examination showed that *this position still existed* The first rectal examination found the head in the transverse diameter of the pelvis and the two fontanels on the same level though there was a moderate internal representation of military attitude On rectal examination during descent continued to find these relations unchanged

After the head had descended well it failed to rotate Flexion did not take place spontaneously and I could not produce it by pressure upward on the sinciput either through the rectum at first or through the vagina later Each time I pressed on the forehead there was no more yielding than occurs when pressure is made on a piece of rough rubber

The head had apparently come to a standstill The patient was becoming very anxious and fretful and the pains were becoming weaker I resolved to accomplish all possible aid before resorting to forceps which is not a desirable thing in deep transverse arrest The membranes were ruptured I inserted my right hand into the vagina placed my fingers on the posterior aspect of the sinciput and my thumb on the anterior aspect of the forehead and I placed my left hand on the fundus *During the next pain I made pressure upward* on the fundus with my left hand and forward on the occiput with the finger and backward with the thumb of my right hand The head did not yield very slightly but when the pain ended and my hand was relaxed it went back to the transverse position I repeated this maneuver with succeeding pains holding the head so that it would not return between the pains and after a time the head was *brought into full rotation and* came under the pubic arch

I continued the Kristeller expression and the head gradually progressed and was born As soon as the bony and soft parts of the outlet permitted the head turned again so that it was in the transverse position occiput to the right As the chin emerged I observed that one wrist was held firmly beneath it effectively preventing flexion It is very probable *that such locking of the wrist hand or forearm be*tween the chin and chest may be a very frequent cause of moderated flexion and that this condition may be the initiating factor which allows other causes to act in producing greater degrees of deflexion

Parenthetically I may say that once before I had delivered a baby by making pressure on the fundus It was on 44th Street New York City about twenty years ago before I ever heard of Kristeller The case was normal except that it was complicated by the most marked hair tufts of the rectus muscles that I have ever seen With each pain the uterus bulged out between the recti and I replaced the action of the abdominal muscles with my *hands* until the baby was born

It seems to me that this manual treatment used in this case of deflexion when possible preferable to the employment of forceps in rotating the head forward in cases of deep transverse arrest and it seems as if it should usually be possible The head was rotated without being followed by the body That is the neck was twisted Forceps *would doubtless have twisted the neck* in the same manner The child had been in perfect condition

The flexation of the wrist under the chin having now been noted as a cause of flexion the question arises whether it is possible while the head is in the pelvis to remove the wrist from its abnormal position Is it possible with or without ether relaxation and anesthesia to pass the fingers up beside the head dislodge the interfering member and then flex the head by pushing upward on the forehead and downward on the buttocks in the fundus

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

IRA KLEIN H MARTIN M D — Managing Editor
ALLEN B KANAVEL M D — Associate Editor

WILLIAM J MAYO M D — Chief of Editorial Staff

AUGUST 1924

GASTRO-ENTEROSTOMY

IT is a bad old custom to disparage existing conditions as a prelude to the introduction of real or fancied improvements Surgeons are not immune to this device for making the new seem better than it really is by making the old seem worse than it really was

I hold no brief for gastro enterostomy It is a very good operation but not so good that it cannot be improved or replaced by better methods It is to be hoped that eventually a method of direct gastroduodenal union will be evolved which will be not only simple and safe but efficient and generally applicable The Finney pyloroplasty and modifications of the Heineke Mikulicz operation such as that of Horsley and the horse shoe gastroduodenostomy of C H Mayo are becoming increasingly useful One must however protest against the exaggerated emphasis placed on the defects of gastro-enterostomy as a reason or one might say as an excuse for performing extensive operations in which a large amount of the stomach is removed because gastro-enterostomy occasionally fails to give the relief expected To remove primarily two-third of the stomach for a gastric ulcer less than 1 cm in diameter because from 10 to 15 per cent of gastro enterostomies for such gastric ulcers fail to relieve or give rise to secondary disorders all of which are curable is radical to say the least How much more radical it is in cases of ulcer of the duodenum to remove two thirds of the uninvolved stomach because 6 per cent of gastro enterostomies for duodenal ulcer fail to give permanent relief It is clearly the duty of mortals who owe to the stomach so many happy sensation to defend it from aggression

Bad news travel quickly and is not readily forgotten Assuming that 94 per cent of the results of gastro enterostomy for the relief of ulcer in suitable cases are satisfactory there are six unsatisfactory cases in each 100 and the discontent over the six unrelieved patients leads one to forget the ninety four who have secured satisfactory results Gastro enterostomy does not give the patient a new digestive apparatus it is not a cure all which will prevent any kind of gastro intestinal trouble for life The person is indeed fortunate who with or without a gastro enterostomy does not at times suffer from gastro intestinal disturbance

In the old days gastro enterostomy was performed for peptic ulcer and when in about ten days the patient left the hospital he was given good advice with regard to his diet Now he is given good advice but too much of it Formerly it was not uncommon to see a patient two weeks after operation for ulcer sitting in a restaurant eating without harm like Jiggs corned beef and cabbage and other articles of food which are viewed cautiously

by persons in robust health Balfour has pointed out that the overemphasis placed on a careful regime for the patient who has been operated on for ulcer suggests to the patient that he is liable to have poor results Often he becomes introspective and watchful hunts trouble and finds it His chance to get well and stay well is not nearly so good as it would have been without the fear inspiring repetition of too detailed instruction with regard to dietetics

Following gastro enterostomy the patient should be advised to take his meals regularly and to avoid food which experience has shown are unsuited to him If he is to attend a banquet he should take his dinner before he goes for banquets are usually later than the regular meal and consist of uncommon foods chosen more for the purpose of justifying the price of the meal than for their food value He should be especially wary of lodge banquets prepared so often by a lodge member who is alone in the opinion that he can cook Above all he should avoid stimulants as he cannot tell from the label what is in the bottle If for any reason he is obliged to be late to a meal he should have with him milk in a thermos bottle and a few crackers or cookies to eat at his regular meal time

Of the 6 per cent of patients who have trouble following gastro enterostomy about per cent develop gastrojejunal ulcer usually in the suture line sometimes from silk sutures hanging in the stoma and occasionally jejunal ulcer a little farther down The best procedure is to cut off the gastro enterostomy and perform some type of pyloroplasty after excision of the original ulcer or preferably a partial gastrectomy as we are now doing in a considerable percentage of such cases In these cases the failure of a conservative type of operation to cure is a solid reason for the removal of a large part of the stomach since only in this way can we permanently do away with the development of acid secretions which give rise to or are supposed to give rise to the trouble However patients without acids have ulcer and spontaneous acid free patients (anacidity and achylia gastrica) as seen in practice often complain bitterly of gastric disturbances so-called dyspepsia

About 2 per cent of the failures of gastro-enterostomy to cure are due to technical errors in performing the gastro-enterostomy Nearly all surgeons perform the posterior no loop gastro-entero tomy but too many make the anastomosis as short as possible on the jejunum without regard to the position of the stomach in the abdomen The jejunum brought to the stomach should be of such length as will apply easily otherwise the stomach will hang on the short proximal limb of the jejunum and will fail to drain satisfactorily Radiogram taken in such a case after operation will show the gastro enterostomy apparently too high and too far to the left

The most serious technical error in performing gastro enterostomy is failure to expose a sufficient area of the posterior wall of the stomach through the opening in the transverse mesocolon In many cases in which a second operation is performed on account of the failure of a gastro-enterostomy to relieve it will be found that the opening in the transverse mesocolon was made too small and the margins of the opening have dropped down and become adherent to the jejunum where it was applied to the stomach In some instances the margin of the opening in the transverse mesocolon is not sutured to the posterior wall of the stomach with sufficient care so that it pulls loose and the jejunum at the site of the gastro enterostomy ulcerates through the opening causing failure properly to drain the stomach or chronic biliary regur

gitation and sometimes an acute vicious circle If the opening in the transverse mesocolon is made large and is fastened securely to the pos terior wall of the stomach so that the poste rior gastric wall will funnel through at the site of the gastro enterostomy such complications will not often occur

A further source of dissatisfaction with the results of gastro enterostomy is poor judg ment in the selection of cases When large gastric ulcers exist a partial gastrectomy should be performed as a primary operation gastro enterostomy alone should not often be considered Again patients who have had an unnecessary gastro enterostomy performed because of mistaken diagnosis of ulcer are often seen and the operation is believed to account for the discomfort they suffer In these cases the history does not suggest ul cer and subsequent operation has shown no evidence that ulcer ever existed

Finally in the remainder of cases in which gastro-enterostomy has failed to relieve the unsatisfactory results are usually due to over work mental or physical or obvious dietetic errors these patients should be under the care of a competent physician

Let us not be too ready to burn our bridges behind us By cautery excision and gastro enterostomy we can cure at least 85 per cent of gastric ulcer and by gastro enterostomy or pyloroplasty with or without excision of the ulcer 94 per cent of duodenal ulcers In considering huge gastric resection for simple duodenal ulcer one is reminded of the early days when it was customary to recommend that the ulcer patient should have had at least nine complete and permanent medical cures before operation Nine cures were chosen because it seemed fitting that the stomach hould have as much chance for its life as a cat but if there were no resources in cases of simple duodenal ulcer except resection of two thirds of a healthy stomach then at least ten medical cures should be demanded be fore recommending so radical an operation in the uncomplicated case W J Mayo

THE LARYNX IN DISEASES OF THE THYROID

It is frequently assumed in connection with thyroid surgery that if the patient s voice is normal the vocal cords are not paralyzed The voice however may be nor mal with one cord paralyzed and practically normal with both recurrent laryngeal nerves injured Although the number of patients who have pre operative or postoperative cord pa ralysis is small it is of vital importance to the surgeon as a protective measure to him self and to the patient to be cognizant of the condition if it is present

Since the work of Semon in 1881, the pro clivity of the abductor muscles of the larynx to become affected first in lesions of the re current laryngeal nerve or of the central ner vous system has been known Hooper Don aldson Semon and Horsley have added from an experimental standpoint to our knowl edge of the nerve supply of the larynx Rus sell in experiments on the recurrent laryngeal nerves in dogs demonstrated that the abduc tor and adductor fibers are in two distinct bundles which can be isolated Stimulation of these bundles separately produced abduction or adduction respectively and section of one bundle resulted *in degeneration* of the muscle or muscles which it supplied He anatomi cally traced the nerve fibers of each bundle to the muscle or muscles which they supplied

In relation to thyroid disease and thyroid surgery there are certain clinical facts that do not fit in with some of the experimental work and general accepted theories It is generally believed that if the recurrent laryn geal nerve is completely paralyzed the vocal

cord will be in the intermediate or cadaveric position and that if the vocal cord is in the middle line position there is abductor muscle paralysis In most cases of injury to this nerve during thyroidectomy the vocal cord is in the middle line position after operation It is unusual to find the vocal cord in the intermediate or cadaveric position after thyroidectomy If it is and it does not completely regenerate it changes to the middle line position as a rule in from three to six months

If one recurrent nerve is injured at the time of operation and the vocal cord is in the middle line position one half of the patient's air is immediately shut off and slight dyspnea may result until the patient accommodates himself to the limited amount of air which is sufficient for respiration This slight dyspnea if it occurs is only temporary However if the patient has a bad heart or is in poor general condition cutting off one half of the air might unfavorably affect the result

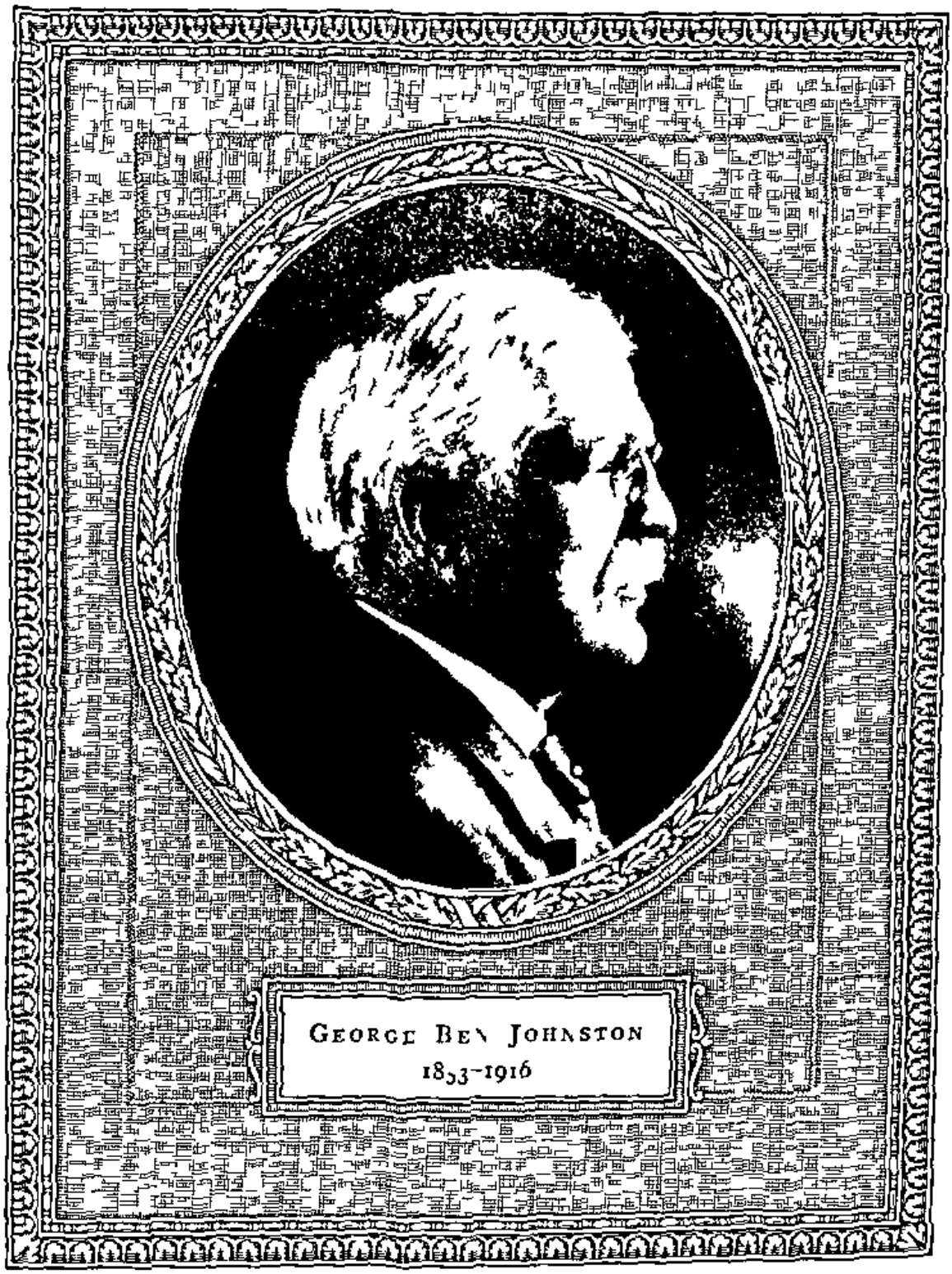
If before operation one cord lies in the middle position because of pressure of the gland the surgeon must exercise additional care when operating on the opposite side If the recurrent laryngeal nerve is injured on the opposite side at operation a very serious condition arises in which the patient may have marked dyspnea

Œdema or hemorrhage around the nerve may produce a temporary paralysis or if these conditions are present around the larynx they may produce dyspnea without involvement of the nerve

The number of cases of serious paralysis of the laryngeal nerve after thyroidectomy is very small and in these cases the cords are in the middle line position or so-called bilateral abductor position This type of paralysis following thyroidectomy is evidenced in three ways (1) The patient may have marked dyspnea at operation The necessity of tracheotomy usually has been attributed to tracheal collapse but we believe that in some cases it is the result of injury to the laryngeal nerves which in turn allows the vocal cords to come to the middle line position and to cause obstruction (2) The patient may be dismissed with a normal larynx without paralysis of the cords and return in from three to six months with increasing dyspnea and voice still almost normal (3) The patient may be without voice but have no dyspnea and the vocal cords be in the intermediate or cadaveric position immediately following operation If the injury to the nerves is a permanent one the patient usually returns in from three to six months complaining of increasing dyspnea as the voice improves

The theories as to the cause of the middle line position of the cords following thyroidectomy are varied The most common explanation is that the abductor fibers of the recurrent laryngeal nerve have been injured at operation or by secondary scarring and that the adductor fibers bring the cords to the middle line position It is rather difficult to believe that injury at operation or by external scarring will so injure only the abductor fibers equally and bilaterally as to cause the cords to assume this position It is also difficult to understand that when both cords are in the intermediate position after operation the adductor fibers regenerate equally and bilaterally and the cords assume this position In short we do not know why the cord assumes the middle line position We do know from clinical observation that the position is assumed by the cords in cases of complete paralysis of there current laryngeal nerve following thyroidectomy It would seem probable that this position of the cords and their movement is due to the action of the muscles of the larynx which are supplied by the superior laryngeal nerve

G B New



GEORGE BEN JOHNSTON

1853–1916

MASTER SURGEONS OF AMERICA

GEORGE BEN JOHNSTON

DR GEORGE BEN JOHNSTON was born July 25 1853 in Tazewell Virginia His ancestors were noted pioneers honored statesmen famous warriors and distinguished physicians His mother Nicketti Buchanan Floyd was the daughter of Dr John Floyd who was a physician of prominence as well as a governor of Virginia Dr Johnston s father was Honorable John W Johnston United States senator from Virginia To these may be added many illustrious relatives among them Patrick Henry who was a great great uncle and General Joseph E Johnston of Confederate fame

Born of this brilliant and sturdy stock and reared among the mountains of southwest Virginia where the Alleghanies mound in foliage covered ranges high toward the heavens or suddenly break into wonderful gaps through which some clear stream works its way toward the ocean after giving liquid sustenance to beautiful and fertile bluegrass valleys George Ben Johnston grew strong in mind body and soul

In youth Dr Johnston s associates were whomever he might happen to meet in a day s journey He was the intimate friend of the village blacksmith the mountain trapper and hunter the town wag and the county scapegoat as well as of the dignitaries

The boys of the mountains mostly settled their own disputes and difficulties either by a certain kind of embryo politics or by fist fighting Young Ben Johnston—he was never called George or Benjamin—was an expert at both Equipped with a fine memory splendid reasoning power patience deliberateness and withal great attractiveness sympathy and far sightedness he naturally became a leader in matters open to argument Handsome well knit strong quick and fearless there were but few that could equal him in physical skill or endurance Although not a quarrel picker he had many Anglo-Saxon fist fights

Dr Johnston s education was begun at the Abingdon Academy Later he went to St Vincent s in Wheeling West Virginia From St Vincent s he went to the University of Virginia Here for two years he took academic work and then following his natural bent he devoted his third year to the study of medicine Leaving the University of Virginia he went to the University of the City of New York to finish his medical education and there he received his degree in

medicine in 1876 at the age of twenty three During the following two years he practiced medicine in Abingdon, being associated with Dr E M Campbell a physician of wide reputation He left Abingdon in 1878 and settled in Richmond where he spent the remainder of his life

From this time on his reputation grew until he became recognized as one of the foremost surgeons of America In 1879 he performed the first operation in Virginia under Listerism He contributed to Keen s *System of Surgery* Bryant and Buck s *System of Surgery* and wrote many conspicuous papers among them being The Treatment of Osteomyelitis of the Tibia Fixation of the Kidney ' and A Description and Report of Cases of the Operation of Splenectomy, and with Dr Murat Willis he devised and published the Johnston Willis operation for suspension of the uterus These and other papers have been extensively quoted

Dr Johnston was a born surgeon who with wonderful energy vast resourcefulness and a tremendous practice kept himself not only abreast but ahead of the times He did but few exploratory operations He used every means of his splendid clinical instinct to make a diagnosis and he was one of the first men in the South freely to call specialists in consultation In his operations he was deliberate skillful astute and thorough

Dr Johnston was at various times president of the American Surgical Association president of the Southern Surgical and Gynecological Association president of the Norfolk and Western Railway Surgeons Association president of the Richmond Academy of Medicine and Surgery, president of the Medical Society of Virginia a member of the House of Delegates and of the Judicial Council of the American Medical Association delegate from the American Surgical Association to the International Medical Congress at Madrid in 1903 delegate of the United States to the International Periodical Gynecological Congress in 1896 and had many other honors bestowed upon him In 1905 he was elected professor of surgery and head of the medical department of the University of Virginia at Charlottesville which position however he did not accept

Dr Johnston was connected with the Medical College of Virginia in various subsidiary capacities until 1884 when he was elected professor of anatomy In 1893 he was made professor of didactic and clinical surgery in 1896 this title was changed to professor of surgery and clinical surgery in 1907 to professor of gynecology and abdominal surgery later to professor of abdominal surgery and when the amalgamation with the University College of Medicine was effected he was elected professor of surgery which chair he resigned two years before his death to become a member of the Board of Visitors of the Medical College of Virginia

He early saw the necessity of a hospital for teaching purposes and in 1893 he established the Hospital of the Medical College of Virginia afterward the Old

Dominion Hospital Soon the necessity for a larger and better equipped hospital became recognized and he interested Mr John L Williams and organized and built the Memorial Hospital Dr Johnston always thought that a negro hospital was to be desired in Richmond and he lent his influence in every possible way to a campaign which was successful in raising $250 000 for a seven story negro hospital and contagious pavillion connected with the Memorial Hospital He also organized the hospital department of the City Home of Richmond

In 1909 he and Dr Murat Willis built the Johnston Willis Sanatorium a hospital for their private surgical practice As outgrowths of this hospital the Abingdon Hospital was established in 1910 and the Park View Hospital in Rocky Mount North Carolina was organized in 1914 Thus to this one man s instru mentality five active hospitals owe their existence

In leadership Dr Johnston was strong and expected loyalty as he gave loyalty but he never made unreasonable demands and he fought in the open Defeat meant to him simply an incentive toward further and more patient effort and the knowledge that he must plan more infallibly for he knew that if his object was worthy and his plans were correct success must eventually be his When his object was achieved there was no dividing of the spoils no blare of trumpets but simply a readjustment to suit the new order of things so that still greater accom plishments might be planned

Dr Johnston was a handsome man in fact he was unusually distinguished looking About average in height his bearing was such that he gave the impres sion of being taller than he really was His head was splendidly shaped and his hair brown and wavy in early life gray in mid life and white later grew grace fully about his broad fine brow His features were regular and clear cut and he wore a short mustache His face and forehead were seamed with lines of care but hi complexion was ruddy and his expression extremely mobile There was no hiding his feelings behind a mask but he had a way of concealing his thoughts by a quizzical expression so that one could never tell what question he was going to ask or what he was about to say As he walked the streets in Richmond he knew every other person he met never having forgot their faces and rarely their names To many he had been their physician or had rendered them some service which gave a somewhat intimate personal touch to his greeting

Dr Johnston had a high pitched voice which added piquancy to his con versation and probably made one pay closer attention because of its distinctive ness but which kept him from being a forceful public speaker In speech he was deliberate in statement accurate in argument conclusive and it has been truth fully said of him that he was powerful in counsel His courtly and gracious manner his distingui hed appearance and elegance of poise were such that upon his entrance he immediately became the center of attraction of nearly any gather ing and men instinctively paid him deference His stories anecdotes and say

ings his friends will never forget but only one may be mentioned here During one of the sessions of the Virginia Legislature a very undesirable osteopath bill came up for committee hearing Ex Governor Charles T O Ferrell was attorney for the osteopaths and Dr Johnston represented the interests of the medical profession During his speech Ex Governor O Farrell stated that the medical profession built a fence around itself which was *horse high bull strong and pig tight* and he repeated this phrase time and again When Dr Johnston arose he ignored all the rest of his opponent s speech and responded in his quizzical and deliberate way in his high pitched voice Yes gentlemen it is perfectly true that the medical profession builds a fence around itself which is horse high bull strong and pig tight but it is with no idea of excluding those who can enter through its scientific gates but simply to keep the jackasses out He sat down and the bill was killed in the committee

With an inexhaustible fund of information gathered from an active life full of experiences and with a deep insight into human nature he was always an instructive and interesting conversationalist

Dr Johnston had an enormous surgical practice and a most grateful clientele As he went from room to room making his rounds it was a rare treat to see him infuse the radiance of his wonderful personality into the sick room A few perfectly chosen words from him would change the whole attitude of a patient from dejection to hope or from despair to resignation Possessing a vision almost prophetic with advice encouragement and assistance he guided many a medical career through college through hospital and special training to the fruition of a large and useful practice His time his labor his resourcefulness and his influence were ever at the disposal of those who wished them

Previous to the last few years of his life Dr Johnston had been in practically perfect health and except for an attack of catarrhal jaundice he had never been in bed a day The feeling of either mental or physical fatigue was almost unknown to him and he had rarely taken a dose of medicine

Several years before his death Dr Johnston began to suffer from angina and frequently he would have an attack and turn and walk to the window or stop on the street to look at something and take a nitroglycerine tablet in such a way that those who were with him did not know that he was in the least uncomfortable He would often tell his intimates God bless the man who invented nitroglycerine! He was on his feet to within a few weeks of his death which occurred on December 20 1916 His wife and four daughters survived him The whole state mourned its loss and it was been written of him—

No duty could overtask him
No need his will outrun
And ere our lips could ask him
His hands the work had done

BEVERLY R TUCKER

CORRESPONDENCE

BIOPSY OF SUSPECTED GROWTHS OF THE RECTUM AND SIGMOID

To the Editor In order to obtain definite knowledge concerning the nature of a growth in the lower part of the large intestine it is necessary at times to remove a section for microscopic study

When the tumor is situated in the lower portion of the rectum a satisfactory idea of it may be obtained by palpation but even then it is comforting to have clinical judgment confirmed by pathological findings before serious operation is advised With a suspected process in the rectum or lower sigmoid beyond the reach of the finger visual examination alone can not give an accurate idea of the depth consistency degree of infiltration and other facts essential to correct judgment Therefore a simple and safe method of obtaining a specimen of the tissue and microscopic examination of it becomes necessary To cut off a section of a suspected growth with a pair of scissors is only practicable when the mass is low down Working through the proctoscope it is impossible to separate the blades widely enough—a difficulty increased in direct proportion to the distance from which the operation is undertaken Other instruments on the market with which a piece of tissue may be cut out are so constructed that they open in the transverse axis of the bowel and a deep and invisible section of the growth is enclosed between the jaws of the punch This is liable to cause bleeding which is hard to control high up in the bowel

To overcome these difficulties the writer found a good use for a bad instrument in the tonsillotome formerly so popular in the surgery of enlarged tonsils With this a piece of tissue is fixed securely and steadily by the prongs of the instrument and is sliced off clean from the surface The cutting edges of the tonsillotome operate in a vertical plane and it is not only unnecessary to cut deep and risk danger from hæmorrhage but a larger part of the surface becomes available for examination

To obtain tissue from a flat ulcerating growth in the lower sigmoid the rectal scoop a long handled instrument is bent at its proximal end to an angle of 45 degrees and provided at its distal extremity with a blunt edged cup With this the surface is curetted The recovered tissue is then frozen and sectioned By this method a diagnosis was made in one case of a very early adenocarcinoma of the sigmoid confirmed by operative findings 4 months later

ARTHUR A LANDSMAN M D
New York

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD MARCH 21 1924 DR. CHARLES S BACON PRESIDING

FIBROMA OF THE OVARY KRUKENBERG'S CARCINOMA OF THE OVARY CHORIOEPITHELIOMA OF THE TESTIS

DR SIDNEY SCHOCHET The first specimen I present is a comparatively rare tumor that is a fibroma of the ovary Fibromata appear to be teratoid in origin because they usually arise from the lateral surface of the ovary This tumor also contained some muscular fibers and was a very firm mass I reviewed the literature as far as I could and found about 80 cases recorded

The second case is a Krukenberg's carcinoma of the ovary It is unilateral No primary tumor could be determined in the gastrointestinal tract The cells appear as signet rings I record this for the *simple reason that it is a primary Krukenberg's tumor* without cysts Some of the cases reported as such have been carcinoid carcinomata arising from the ovary All of these cases prove fatal I hope my patient will live a long time but if she dies I hope to get an autopsy

The third case is the second one of its kind I have seen in the last 9 months which makes the ninety first case on record I had Dr Reis and Dr Ewing look at it *Dr Reis confirmed my diagnosis Dr* Ewing was a little bit skeptical We have definite syncytial cells and definite cells of Langerhans I report this case because it brings home to us that *chorio epithelioma does not necessarily arise from* placental tissue We must look at it as arising from some primordial fetal cell

CARCINOMA OF THE KIDNEY

DR W C DANFORTH I would like to show a specimen of carcinoma of the pelvis of the kidney The patient was a woman of 64 A diagnosis of tumor of the kidney was made 3 months ago in another hospital but she declined any operative interference She was terribly emaciated with an enormous mass in the right hypochondrium Apparently nothing could be done surgically but at the urgent *request of the family a short incision was made* which was closed promptly She died about a week or 10 days later The autopsy disclosed an enormous kidney almost the entire bulk of which was taken up by the tumor mass Microscopic section showed a squamous cell carcinoma of the kidney The autopsy also showed in the bladder secondary tumors which can be seen very plainly in the specimen the one covering the right ureter being histologically similar to the kidney tumor The specimen shows a mass of carcinoma growing out from the renal vein into the vena cava

These carcinomata of the kidney are rather uncommon Both Dr Williams our pathologist and I thought it was *probably* a papillary carcinoma *It* is a squamous cell carcinoma This is the second carcinoma of the kidney which we have encountered on our service in 2 years I think that we who are doing gynecological work should remember the frequency with which urological conditions occur So far this year we have had two ureteral strictures and one Hunner's elusive ulcer in addition to the specimen shown tonight

DISCUSSION

DR EMIL REIS Will Dr Danforth tell us about the *origin of that tumor If it was a squamous cell* carcinoma where did it come from?

DR W C DANFORTH I do not know

DR J L WILLIAMS I think the origin as likely in the renal pelvis The cells resembled in some respects those of a tumor of the renal pelvis containing transitional epithelioma and it occurred to me that that was the most likely seat of origin of this tumor The tumor occupies that portion of the *kidney usually taken by the renal pelvis*

DYSTOCIA FROM THE RUPTURE OF A DERMOID CYST DURING LABOR

DR BERTHA VAN HOOSEN Patient 17 years of age gravida I negative history and Wassermann was admitted to the Cook County Hospital at 5 p m on March 21 1924 Labor had begun at 4 a m of the same day On rectal examination it was found that the bag of waters had ruptured cervix was effaced and the os was dilated 1 to 2 centimeters Maternal pulse was 80 fetal heart tones 140 Pelvic measurements were 23 26 28½ and 9 diagonal conjugate 9 First stage ended at 2 4 p m on the 21th there being no progress for one hour Examination was made and revealed a mass which was thought to be attached to the rectovaginal wall and which made delivery per vaginam *impossible* Cæsarean section was advised

I was called at 2 30 p m and on making an examination I found a tumor mass in the posterior cul de sac extending downward and obstructing the passage of the head Thinking that it was barely possible that an ovarian tumor had ruptured and that the contents were obstructing the head I felt it would be wise to make a posterior colpotomy drain off the ruptured tumor contents and possibly push the sac up out of the pelvis An incision into the posterior vaginal vault was followed by the discharge of a thick yellowish material in which were particles resembling hair Further examination within the operative wound revealed a thick walled collapsed tumor mass which was removed by sponge holder The sac had no attachment to anything within the pelvis Within the sac there was hair The tumor mass had the remains of a pedicle which had been completely ground off probably by the downward passage of the head A gauze drain was inserted into the posterior colpotomy incision and shortly after the head came down to station + three but no further progress was made for an hour The next operation was the application of low forceps as the pelvis was large enough for the passage of the fetus Prior to the application of the forceps a bilateral anterior episiotomy was performed

At the present time the mother is in fair condition and the baby is in good condition

I thought this case interesting in that it illustrates three points (1) The force of the contractions of a uterus that would grind off the pedicle of a tumor in an absolutely bloodless manner must be tremendous Not one drop of blood was noted in the material discharged from the pelvic cavity (2) We may have gone a little too far in rectal examination If this patient had had a vaginal examination at the beginning of labor an early cæsarean section would have been indicated (3) We hear a great deal about the contents of a dermoid being so terribly irritating In this case the entire contents were poured out into the peritoneal cavity yet the patient with the exception of having a little temperature has had a very uneventful convalescence If peritonitis were going to develop as the result of the intraperitoneal rupture of the dermoid cyst it would doubtless have done so before now

BENIGN TUMORS OF THE PLACENTA

Dr R A Scott presented a paper on Benign Tumors of the Placenta (See page 216)

DISCUSSION

Dr Emil Ries I have seen only one tumor which was exactly the same as this I reported it to this Society about 20 years ago The essayist's literary review is rather interesting especially as to the various theories concerning the origin of these tumors How anybody can consider congestion or arteriosclerosis of the mother as the cause of a disturbance in the vessels of the chorion is rather difficult to see in the light of our present knowledge of the absolute lack of connection between the maternal and fetal vessels Besides there is no evidence anywhere in pathology pointing to any possibility of angiomatous tumors being produced by congestion There is no more frequent congestion in vessels than that seen in varicose veins of the lower extremities yet the practically complete absence of tumor formation in these veins should discount any theory of congestion as the cause of tumors in the placental vessels

I do not know of a single case of angioma of the placenta in the presence of an angioma in the child—not that I think of this as a sort of metastases of angiomatous tumors of the placenta into the child rather I would think of the possibility of systemic disease of the vascular system leading to multiple tumor formation I am interested in that because just recently I saw a young girl who came to me 2 years ago with multiple blackish tumors of the foot She had at that time five tumors She had had six but one had been extirpated by some one and examined microscopically and diagnosed melanotic angio arcoma Under that diagnosis the girl had been given up She had refused amputation which was proposed by the first surgeon and she made the rounds of the various clinics and by and by appeared at our clinic She was given X ray treatment for some time but while under treatment developed two more tumors so that now she had eight counting the one which was extirpated The two new ones were a little higher up As I was doubtful about the malignant nature of these tumors I asked permission to take out one It was a plain angioma with nothing malignant about it Plain angiomatous tumors are benefitted more by radium than X rays The patient is receiving this radium treatment now I diagnosed the case systemic disease of the blood vessels rather than metastases of a malignant type We might think of the possibility of systemic disease of the blood vessels in the placenta and fetus and the attention of the gentleman is invited to the possibility of discovering such a case

Dr W C Danforth I would like to suggest the value as indicated by this interesting presentation of routine pathological examination of the placenta such as is now being carried out in a good many institutions We have been doing that for the past 4 or 5 years and various things have been voted that otherwise might have been overlooked

Dr Sydney Schochet I would like to ask Dr Ries if radium or X rays cause a more marked metastasis in melanotic sarcoma arising from the blood vessels I recall a case at the Philadelphia General Hospital in which there was a limited area in which radium was used for 3 or 4 weeks The woman had millions of these melanotic sarcomata over the body a general sarcomatosis At autopsy the whole peritoneal cavity was literally covered by these tumors I recall that in the discussion at that time it was said that radium and X ray would stimulate the growth of these tumors

Dr Emil Ries Dr Schochet speaks of a malignant tumor I do not consider this a malignant

tumor The doctor speaks of melanotic tumor This is a plain angiomatous tumor and not melanotic The dark color is due entirely to coagulated blood and not to the presence of melanotic pigment

DR CAREY CULBERTSON A study of the literature shows that there is not a concensus of opinion with respect to the nature of these growths By some they are accepted as true neoplasms When *they are encapsulated and discrete like this tumor of Dr Scott's and like many of the others reported* they certainly appear to be true angiomata and therefore true neoplasms Some writers particularly Hanchu and Savy regard them as representing a thrombosed retrograde degenerative process as a result of which there being a thrombosis of the large vessels dilatation of the capillaries produces a condition looking like angioma In such cases however there is a rather diffuse arrangement not so discrete and accompanying them there is more apt to be hydramnios death of the fetus and premature labor all three conditions suggesting a syphilitic origin The relation in other words between chorio angioma and syphilis has not been ruled out though the fact that where it has been discovered gumma in the placenta has not been coincident would tend rather to disprove syphilis because if the growths were syphilitic in origin one would expect the placenta to show other evidence of syphilis

The tumors were distinctly benign as Dr Ries has pointed out in every case Nebesky some 10 years ago reported 88 cases gathered from the literature adding one from his experience all of which were distinctly benign

DR J L WILLIAMS I might say that the surfaces made by cutting this tumor were strikingly like those of an organized blood clot in the placenta and at first this is what the tumor appeared to be though it was distinctly encapsulated and could be shelled out of the capsule but the microscopic sections showed that it was composed as Dr Scott has shown of multiple blood vessel spaces of various sizes lined with epithelium The thrombosed vessel running into this was apparently secondary as the tumor had undergone some retrogressive changes due to this thrombosis so that so far as the thrombosis causing the tumor was concerned I do not think that likely

DR GUSTAV KOLISCHER read a paper entitled The Modern Theories of Electricity in Their Bearing on Roentgenology

The moſt excel-

ent worckes of Chirurgery made and ſet forth by maiſter John Vigon head Chirurgien of oure tyme in Italy, tranſlated into Engliſhe Wherunto is added an expoſition of ſtraunge termes and vnknowen ſymples belonggynge vnto the arte

Imprynted by Edwarde Whytchurch wyth the kynges moſte gracious priuilege for ſeuen yeres.

Cum priuilegio ad imprimendum ſolum

Anno. D. 1539.

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J BROWN M D F A C S Omaha Nebraska

THE SURGERY OF JOHN DE VIGO

The practice of surgery in Italy began practically with Giovanni de Vigo of Rapallo near Genoa He was born in 1460 and died in 1519 and was the father of the so-called Roman school of surgeons In medicine he followed the footsteps of his father Batissta di Rapallo who is said to have been the inventor of the apparatus major a method used in lithotomy Batissta did not instruct his son in this method but according to Baas communicated it to Giovanni de Romanis of Cremona Ultimately it came to Mariano Santo di Marletta (1489 1539) and was published by him in 1531 It was learned by Ottaviana da Villa an itinerant surgeon who practiced lithotomy and by him taught to Colot through whom it reached France

Being the son of a physician John de Vigo took up the same line and became a great student of the former masters but did not progress very far beyond them as his book is filled with references to Hippocrates Galen Avicenna and so on and is practically a compilation of their work He seems to have been a very well read man and a hard student but not much of an independent thinker

The Italian surgeons of the time had a somewhat inflated idea of their dignity and believed that working with their hands put them on a lower social plane So de Vigo believed that operations were much beneath the dignity of a learned man and should be referred to the itinerant physicians This may be one of the reason why his father's lithotomy was not transmitted through him De Vigo did however introduce the crown trepan and for hæmorrhage used the ligation of the older masters in which the vessel was transfixed by a needle and tied above it as in the hare lip suture

His book was translated into English by Bartholomee Traheron and dedicated by him to Rychade Tracie It bears as its title (as shown in the illustration)

The Most Excellent Workes of Chirurgery made and set forth by maister John Vigon had Chirurgien of our tyme in Italy translated into English Whereunto is added an exposition of straunge termes and unknown examples belonging unto the art It was printed by Edwarde Whytchurch in 1550 Neither Tracy nor Traheron were physicians but both were students of early scripture and higher learning of all kinds Tracy had taken care of Traheron who was left an orphan at an early age and educated him both in England and abroad and the translation of de Vigo's work was an appreciation of this kindness by Traheron and rather an exhibition of his ability at translating than a desire to render any great service to medicine Traheron's opinion of medicine was not very high and he did not particularly approve of it but believed that most diseases were the punishment of sins He begins his dedication by saying God the myghtie governer of all thynges long tyme sythens hath witnessed by his excellent prophet Moses yt for the transgression of his holy lawes he wolde plage the people wt ondrye & grevouse disease Howbeit our blindenes hath ben so great yt in the multitude of most fylthye and shameful botches sores & other pitious maladie we have not perceaved how horrible a thynge synne is & how present vengeau(n)ce the dyspysing and neglecting of goddes dredfull co(m)au(n)deme(n)tes bryngeth uppon us no not when we have be burnte wyth fyery carbuncles nor when oure fleshe hath bene toren from the bones & eaten up wyth lothsome cankers nor whe(n) we have ben myserably torme(n)ted wyth yt moste fylthy pestiferous & abominable dysease the frenche or spanyshe pockes Later in order to justify himself he says that for the purpose of helping mankind God gave Vertues to herbes stones trees and metalles where wyth our evels myghte be eased & also styrring up me(n) to note suche thynges and to practyse them upo(n) our pavnfull griefes The introduction is so heartfelt that one is led to wonder if some ailment of his own did not lead Traheron to study and translate de Vigo's work and to pick this author out as he was not an operator but preferred treatment by salves and ointments at which he was a master

De Vigo's work as a whole follows the usual form of the surgeries of the time First after an index he gives a short résumé of the Galenic anatomy He then diverges a little and discusses inflammations of various types as well as adds a chapter on syphilis before taking up fractures and dislocations to which he devotes only a short pace The remainder of the work contains an antidotary a discussion of various medical conditions (among which is a rather full discussion of Tertian fever) and closes with a chapter of definitions of straunge words which are really medical terms

His name still remains in our modern pharmacopeia attached to Emplastrum de Vigo or mercurial plaster of which he was originator

BOOK REVIEWS

A REVIEW OF NEW BOOKS IN SURGERY

THE little volume on ulcers of the stomach and duodenum[1] is one of the series of medical mono graphs now being published in France The aim of these monographs is to make available for the practitioner and the advanced student the informa tion scattered through the larger treatises and text books

The volume under discussion in the opinion of the reviewer accomplishes this purpose very well There is a brief historical sketch of the development and growth of our ideas regarding the peptic ulcer This is followed by an analytical detailed discussion of the symptomatology and diagnos s Each symp tom and sign i carefully e aluated The various adjuvants in the diagnosis such as the stomach tube fluoroscopy roentgenography etc are thor oughly discussed

The authors regard the views of their Anglo American confreres as somewhat too dogmatic This particularly refers to Moynihan s Syndrome On the whole however their views are much the same as ours The volume sums up the kno led e up to date The authors display familiarity with the work of the English and American writers care fully avoiding mentioning German nam s promi nently associated with this field The war is evidently not quite over

ONE cannot help but be amazed at th progress made during the past decade in all branches of civic industrial commercial and scientific enter prise Modern methods draw the world very close ly together They stabilize the world as it were To say a method is American or English is practically to confess ignorance Rapid transportation the wireless the aeroplane place us all under one roof A method is no sooner born in one country than other nations know of it and are ready to dispute it or sanction it Scientific medicine is certainly no exception to this as is manifested by the almost countless number of fo eign physicians who are con stantly seen in America and the number of American physici ns who are planning to spend a fortnight in Europe to brush up It is ery apparent that this intimate fusion of ideas and thought will not permit national methods or habits except as they may be influenced by climatic necessities and econ mic conditions This is very clearly exemplified in the re-edition of the *System f Surgery*[2] edited by Choyce In this system of surgery we have incor porated English surgery as it is taught and practiced by English surgeons of the first rank It is no better and no worse than American surgery at its best, in fact it is surgery at its best as practiced in all mod ern and progressive nations of today

This re edition was begun in 1914 but the stern respons bilities of the war caused years of delay and not until 1921 was the task resumed The system consists of three olumes edited by C C Choyce Among the contributors may be found the master English surgeons masters not only of surgical diagnos s pathology and technique but masters of English phraseology and rhetoric Volume I covers the general principles of surgery and certain specific diseases The very lucid description of the process of suppuration by Sir G Lenthal Cheatle and the chapter on tumors by Raymond Johnson and F W P Lawrence are written in a masterly way and for clarity and completeness are rarely sur passed Volumes II and III are devoted to regional surgery and here again are certain outstanding chapters Handley pre ents the surgery of the breast in a most masterly fashion He devotes much attention to carcinoma and to his theory of permeation of cancer the latter being accepted more and more by surgeons the world over There is a comprehen sive chapter on the tongue by W H Clayton Green An unusually interesting and instructiv description of the surgery of the stomach and duodenum is pre sented by She ren The surgical diseases of the in testines are presented by Alexander Miles and aga n this master surgeon do s not disappoint us Prob ably the best ch pter in this entire volumi ous work is that written by Wilfred Trotter on the scalp skull and brain Every phase is entered into in a most critical manner Concu sion and its mechanism of production is d scribed in a fascinating way His a alysis of the symptom of brain injury as they may influence a correct d agnosis and the indication for treatment is very logical and cert inly opens the w ay for a clearer understanding of this complex prob lem Some of the ch pters were rather d sappoint ing to the reviewer mong these the chapt r on the female g nital tract and th t devoted to fractures

A tremendous amount of informat on is presented in th se volumes in a very pleasing manner The text is profusely illustrated m ny illustr tions being in colors and e ceedingly w ell done The work is a distinct asset to a surgeon s library

[1] Les Ulcè L'Estom ac et D odenum By Ed En qu Gaston Durand. Paris Masso t Cie 4.

[2] A System of S vol i d Ed ed by C C Choyc C M G C B E B Sc f D F R C S P h lorical ed or J Martin Bea tie M A M D C M N w York Paul B Hoeber 0 3

HERNIA is one of the most common surgical conditions confronting the medical profession today During the past decade or longer the student and interne have been taught in many instances that practically the final word has been said This is a serious mi take as is demonstrated by some recent investigations notably those of Seelig and others Failures in the past have been more frequent than we were allowed to believe A work which incor porates a greater part of the data on hernia up to the present time is certainly desirable The recent volume by Watson[1] is such a work The author does not claim anything new or original but presents within reasonable space the most important fea tures of the anatomy etiology symptoms diagnosis differential diagnosis and prognosis of hernia to gether with the best operative technic of modern surgeons Two outstanding features of this work are more than worthy of comment the very com plete and interesting historical sketches which pref ace many of the chapters and the extensive bibliog raphy These two features at once stamp this work as a tremendous task consummated

Many of the pitfall which the younger surgeon might fall into are discussed The rarer forms of hernia are described in great detail and beautifully illustrated Practically every complication of hernia and its treatment are taken up in a very logical man ner and in a closing chapter consideration is given to the medicolegal aspect of this condition The text is profusely illustrated and here again it is but just to compliment the author for the excellent work of his arti t Mr Shepard This work can be heartily recommended to the student and to the practitioner al ke who may be seeking data on the subject of hernia

THE little monograph[2] by Morley is indeed most welcome However much we may know about hæmorrhoids there is still much to learn and the medical profession as a whole is most ignorant and careless about this common malady The ques tion often ar ses Does an operation cure hæmor rhoids so long as the questionable etiological factor remains? No doubt many cases are very much bene fited or are cured by operation not a few are made worse and a certain number are not benefited at all These facts must mean that we as a profession are not devoting enough energy toward clearer under standing of this very common condition Therefore any work placed before the profession which causes comment and criticism will be constructive The outstanding feature of this little work is the author s method of treating internal hæmorrhoids and his results He advocates the injection of internal hæmorrhoids with a 20 per cent solution of carbolic acid in glycerine at weekly intervals His results in the treatment of some 3 500 cases are phenomenal and surely warrant the serious consideration of the medical profession The method is devoid of danger and the disability is practically nil It is the re viewer s opinion that this procedure should be more frequently used and that possibly in time operation for internal hæmorrhoids can be entirely dispensed with The author should be congratulated for his stand on this subject and for the presentation of this monograph JOHN A WOLFER

A WOMAN S Quest[3] is a book well worth reading and will appeal to two classes of people Men and women who are broad enough to recognize men tal equality without sex antagonism and women engaged in professional and educational advance ment

Dr Marie Zakrzewska was an example of per severance stability skill and determination such as few possess She strove against social ostracism prejudice and all kinds of hardships and privations To those of us following her line of work she is an inspiring influence and example

In her study of different subjects religion spirit ualism etc as well as in her ability to establish hos pitals and dispensaries in the face of seemingly in surmountable obstacles she exhibited rare tact much knowledge and a universal tolerance

One of Dr Zakrzewska s Cleveland friends says of her wide reading She always knew the best apple on every tree of knowledge and her mind was stored with the condensed wisdom of many libraries

Any one disheartened in trying to maintain a prin ciple or reach a goal should read this book

JULIA C STRAWN

[1] H rnia, I ts An tomy E tiol gy ym ms D gnos D ff re tial Diagnos Prognos d Ope T m By Le h F W so M D S Louis C V M by C mpany 9

[2] Hæm rrh ids Th E iology P ph l d Trea m by Mea (L ject B Arth S M l y F R C S (E g) Lo d Henry Frowd d Hodd & S oughto 9 3

[3] A Woman Q est Th Lif f M E Zakrzewsk M D Ed ed by Agnes C Viet M D F A C S N w Y k and Lo do D Appl d C mpa y 9

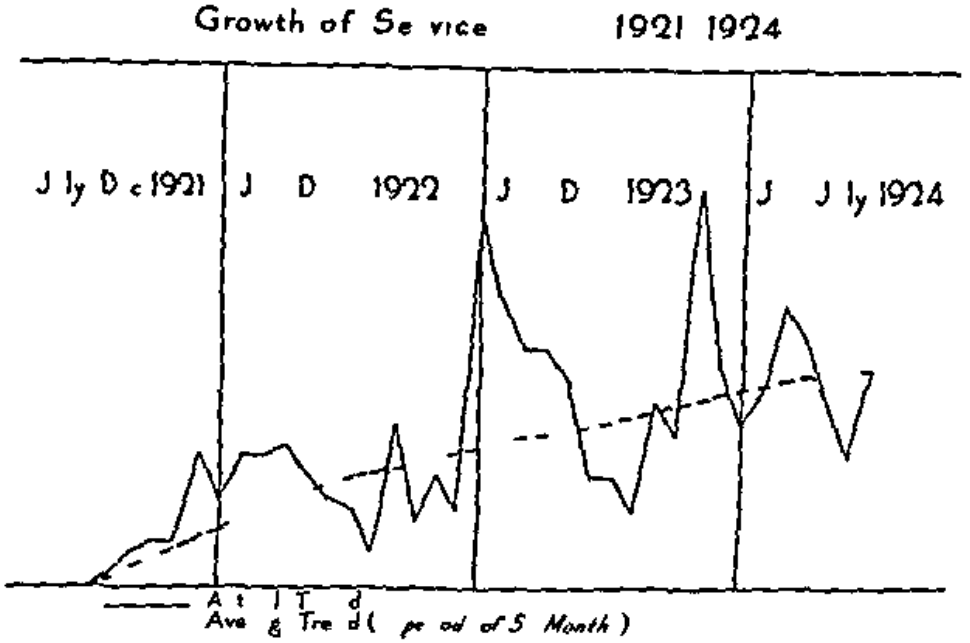
AMERICAN COLLEGE OF SURGEONS

GROWTH OF SERVICE OF THE DEPARTMENT OF LITERARY RESEARCH

THE increasing demand for the service of the Department of Literary Research calls for a proper distribution of requests throughout the year This can best be illustrated by the accompanying graph The peak comes each year in the fall and the lowest point in midsummer

Department is organized to serve the member wherever they are located The field of service has now been extended from England to Korea and from Canada to South America

Requests are received for bibliographies abstracts and translations for use in connection



There is a distinct advantage to those using the service for papers for the fall and winter meetings when the requests can be sent in early Comprehensive pieces of research work are handled to advantage during the summer months Emergency requests are not to be discouraged however as the Department stand ready to serve at the convenience of the surgeon

The number of requests for research work practically doubles the number of the year before The present year begins low as the peak has been advanced because of the effort made last fall to get the requests in early A large proportion are now repeat requests from surgeons or groups of surgeons who have used material prepared by the Department

Although the Fellows located near the Library of the College were the first to use the service the with the preparation of papers on medical and surgical subjects Data has also been compiled direct from hospital records to supplement the surgeon s material or furnish data from different sections of the country for comparison Of even greater interest are opportunities to be of service in the surgeon s practice to furnish information from the literature applicable for example to an unusual case under his observation or to some new method of treatment The Department also has charge of continuous pieces of research whereby the surgeon is furnished with reports of current literature on the subject of his interest

The type of work in any case depends upon the surgeon s request It varies from the selecting of loan material from the Package Library to the preparation of a most comprehensive review of the literature

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FOURTEENTH ANNUAL SESSION NEW YORK–BROOKLYN OCTOBER 20– 4 1924
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THE FOURTEENTH ANNUAL SESSION IN NEW YORK AND BROOKLYN

WEEK'S PROGRAM IN BRIEF

Monday October 20

10–1 Hospital Conference Ballroom Waldorf Astoria Papers and discussion
2–5 Hospital Conference Ballroom Waldorf Astoria Round table conference
8 Presidential Meeting Ballroom Waldorf Astoria Inaugural address of President Elect and Murphy Oration in Surgery

Tuesday October 21

9–1 Clinics and demonstrations at the hospitals and medical schools
10–12 Hospital Conference Ballroom Waldorf Astoria Papers and discussions
2–4 Clinics and demonstrations at the hospitals and medical schools
2–5 Hospital Conference Ballroom Waldorf Astoria Round table conference
8 Scientific session Ballroom Waldorf Astoria Section on general surgery etc papers and discussions
Scientific session Empire Room Waldorf Astoria *Section on surgery of the ear* papers and discussion

Wednesday October 22

9–2 Clinics and demonstrations at the hospitals and medical schools
2–5 Clinics and demonstrations at the hospitals and *medical schools*
8 Scientific session Academy of Music Brooklyn Section on genitourinary surgery etc papers and discussion

Thursday October 23

9–12 Clinics and demonstrations at the hospitals and medical school
2–4 Clinics and demonstrations at the hospitals and medical schools
Annual meeting of the Fellowship of the American College of Surgeons Ballroom Waldorf Astoria
8 *Scientific session* Ballroom Waldorf Astoria Section on general surgery etc papers and discussions
Scientific session Empire Room Waldorf Astoria *Section on ophthalmic surgery papers and discussions*

Friday October 24

9– *Clinics and demonstrations at the hospital and* medical schools
2–5 Clinics and demonstrations at the hospital and medical schools
8 Twelfth Convocation of the American College of Surgeons Ballroom Waldorf Astoria

THE large number of registrations for the New York Brooklyn meeting already received at the office of the Director General would indicate that the limit of attendance will be reached weeks in advance of the meeting It will be necessary to enforce strictly the rule limiting attendance to a number that can be comfortably accommodated at the clinics The limit of attendance is based upon the result of a survey of the amphitheatres lecture rooms and laboratories in the several hospital and medical schools as to their capacity for accommodating visitors This plan necessitates registration in advance on the part of all who wish to attend and when the limit of attendance has been reached through advance registration no further applications can be accepted

Attendance at clinics and demonstrations is controlled by means of special clinic tickets which plan has proved an efficient means of preventing overcrowding at the clinics and provides for the distribution of the visiting surgeons among the several clinics The number of tickets issued for any clinic is limited to the capacity of the room in which that clinic is given

The preliminary clinical program revised and corrected to date will be published in the September issue of this journal The real program of the Congress will be issued daily during the session it will be posted each afternoon on bulletin board at headquarters giving a complete detailed description of the clinics and demonstrations to be given on the following day

All branches of surgery will be represented in the program an important feature of which will be a series of clinical demonstrations or daily clinics in which surgeons internists pathologists roentgenologists and other specialists will participate bringing to bear on important surgical and border line subjects the newer ideas as developed in various departments of medicine

Programs for the evening meetings are being prepared by the Executive Committee of the Congress On Tuesday and Thursday evenings in the Ballroom of the Waldorf Astoria and on Wednesday evening in the Academy of Music in Brooklyn papers dealing with subjects of interest to the general surgeon gynecologist urologist orthopedist and obstetrician will be presented by eminent surgeons of the United States and Canada and distinguished visitors from abroad Programs are also being prepared for two special meetings at which papers and discussions will deal with subjects of special importance to those interested in the surgical aspects of ophthalmology otology rhinology and laryngology to be held in the Empire Room of the Waldorf Astoria on Tuesday and Thursday evenings It is expected that the complete program for the evening meetings will be published in the September issue

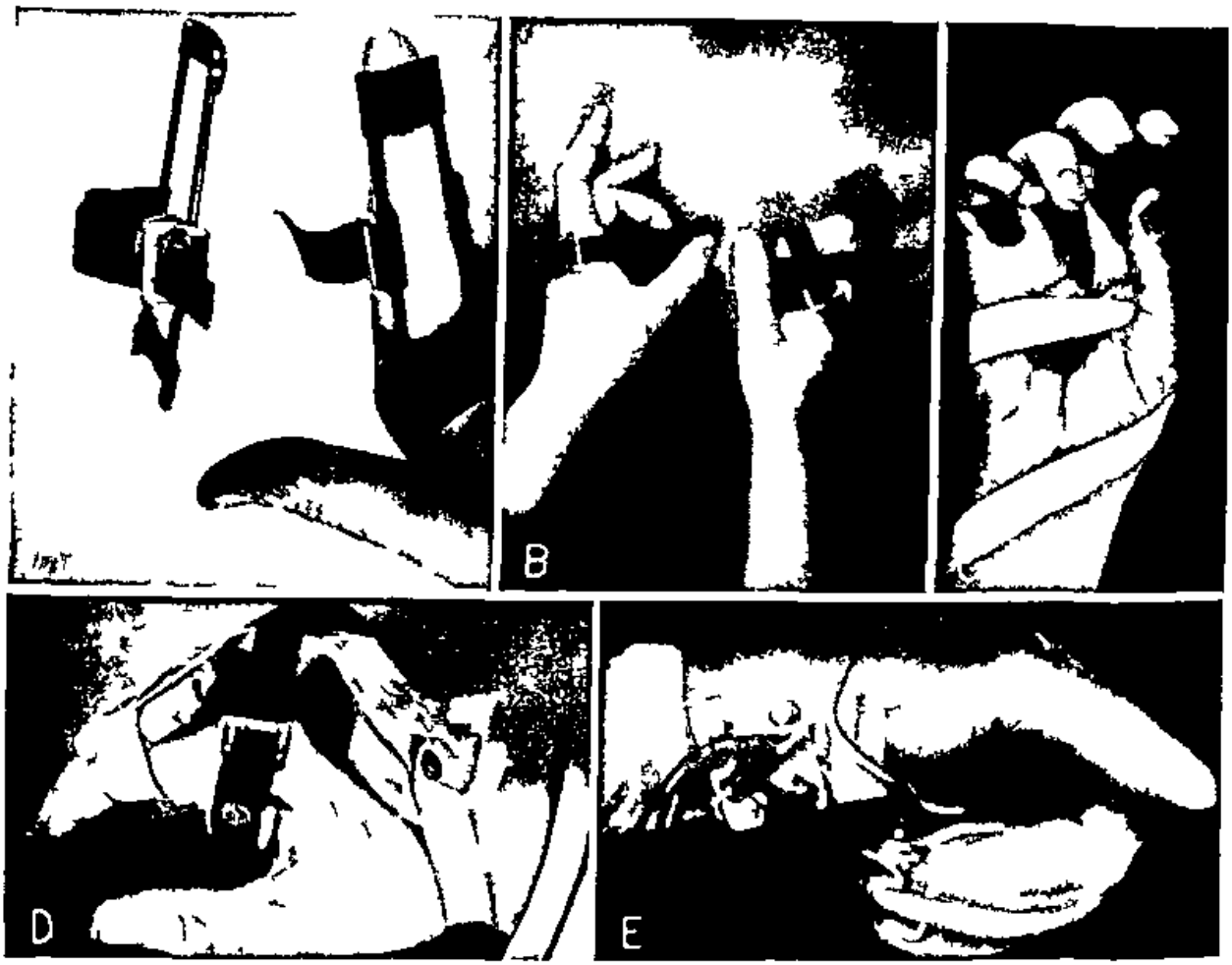


FIG 7 T o SPLINTS USED BY AUTHO

A Saf ty pin plint ed t t d fi ge th mb t stra ht f t ed ph l The trap draws the fing f rw d bet e th t rod

B Web l lt a d b kles sed t d aw th fi g j t t fl ı by l m ld c t u tra t \ rı the w ys f pply g th t p ca be sed

C M thod f m tai g ppo t f th mb t fing rs ın med p l y Th th mb dra t rd the p f rm b e bv t ms f trip f dh th t gnpa d th ha d df rm Th th mf p lled al g th l e f th ult t f th se t f

D Splint u d t fl th p xım l h g r j ts A m t l b crosse j th he d f th met rpal d bv t ght ng th b lt d b kle h ch re at t hed t th b th des ed train is p t p th fi g j t

E M thod ed t fl f th th p xımal finge j ts ft u ʞ pli t h w t *D* d f fl ing th middl fi g j t Th rd p ll g f m th fing ds m d f t t l l t rı ted to th gl t th wrist Th l t ll pe to ll w r m al f th gl

SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE PUBLISHED MONTHLY

VOLUME XXXIX SEPTEMBER 1924 NUMBER 3

RECONSTRUCTIVE SURGERY OF THE HAND

BY STERLING BUNNELL M D SAN FRANCISCO CALIFORNIA

INJURIES from manual labor are usually of the hand and so it is that hand injuries constitute by far the largest part of industrial accident cases As a number of these result in permanent disabilities there are in every large city thousands of crippled hands in need of repair If a worker be entirely dependent on manual labor for his livelihood his earning power is seriously impaired when his most valued member is crippled

When we consider what a wonderfully perfected piece of mechanism the hand is it is not surprising that successful reconstruction of it by surgery is unusual Much however can be done if one will give the time care and patience The usual surgical procedure is too rough so it is necessary in this work to use as nearly as possible an atraumatic technique

In hand reconstruction certain main principles must be kept in mind The rest depend on a host of tiny but important detail

MAIN PRINCIPLES

The wrist and fingers must first be put into functionating positions That is the wrist should be cocked up in extension and the fingers should be partially flexed and especially in their proximal joints The thumb should oppose the fingers A hand with a straight wrist with extended proximal finger joints and with the thumb at the side of the hand is practically useless While the case entrusted to our care is undergoing healing from infection or injury we will be negligent if we do not maintain these functionating positions

Joints must be mobilized before tendons are repaired or no motion will result We cannot expect a newly repaired tendon to move a stiff joint nor should we repair a bone and at the same time a tendon or joint The former demand postoperative immobilization and the latter mobilization

In all dissections of the hand it is essential in order to protect anatomical structures especially nerves to dissect with accuracy and to avoid the trauma of sponging to operate under the ischæmia of a tourniquet such as a blood pressure band Too long an ischæmia will provoke a generalized tissue reaction which results in a degree of firm induration of the parts—an hour is safe 2 hours gives some reaction The pneumatic blood pressure band will not cause paralysis After the arm has been held vertically long enough for the veins to collapse the band should be pumped up very rapidly until over the systolic pressure so that the veins will not have time to refill For this speed a bicycle pump excels a bulb Local anæsthesia and especially with adrenalin is best avoided as it lowers the resistance of the tissues The tissues must have maximum vitality for healing

After trauma infection or operation the tissues are usually densely indurated A second operation on such tissues will result in the summation of cartissue and so had best be



b *c*

Fg M s J D ge 48 F ll wt g a s e e e ceph aht th h nd wa drawn by the u qual p ll f the m cl s1 to the xt me c nt act f ri t and fingers hown in a wh h had e ted 3 years

Tr tment By the prnc ple of low m ld steady tra tt n th jo nt wer g ad lly *tr ghtened and the fl o* muscles t etch d I *b* 1 sh wn the comm cem nt f t t me t u g n in ted ock up spl nt th metal t n n d t lly f t act co d Vari s ther spl t w re used nd fin lly the j 1 ts w e m b lized u d r anesthesia I c is sh wn the e te n obta ed m nths St ength ret ed th e t ns m scles wh h h d been *rst et hed a d celle t f ct f th* ha d and wrist w s obtained

delayed a few months The final result is not obtained until after the softening up process has taken place This often takes a year

I have been disappointed with the results of physiotherapy as usually practiced and have far more faith in certain exercises the actual use of the member and last but not least the time factor

For most reconstruction special splints must be used These the surgeon himself should make to fit the case They are usually made of metal They should be boiled up for application at the end of the operation

It is most important for later reference to make a complete record of a case before the repair is attempted This should consist of photographs showing limits of motion measurements of joint motion condition of the bones joints and tendons amount of loss of nerve function both motor and sensory presence of contractures degree of induration of tissues and finally the strength and practical function of the hand By establishing a record of the exact condition before repair the degree of improvement in the final result can be ascertained

MOBILIZING JOINTS

In examining a hand if we request the patient to flex his fingers fully and to maintain the flexion and then we find that we can passively flex the fingers still further without encountering resistance we know that in his case the tendons are more to blame for his lack of power of flexion than are the joints If however we cannot passively flex the fingers further than he can do so actively we know that in this case the joints are more at fault than are the tendons If we can bring the joints into



a *b*

Fg F M ge 7 At th e f 4 m th h s h r f ll f rwa d nd both h d est d a h t t ult th d f rmity n Th d g t e t th l mut f ext 1

Oper t T t bul ped l s w p ep ed a m *b* Th c rs th mod tel c t ted fing rs w l e ed f th rt b c tt ga enes f V al g th m d s turning th m Y Th la g k l d cars e sed l th ed w th good k f m th pedi les Th hand w t h ld e t s b m t l pl ts Th ult mmed t ly ft th compl t n f th opera t s h wn



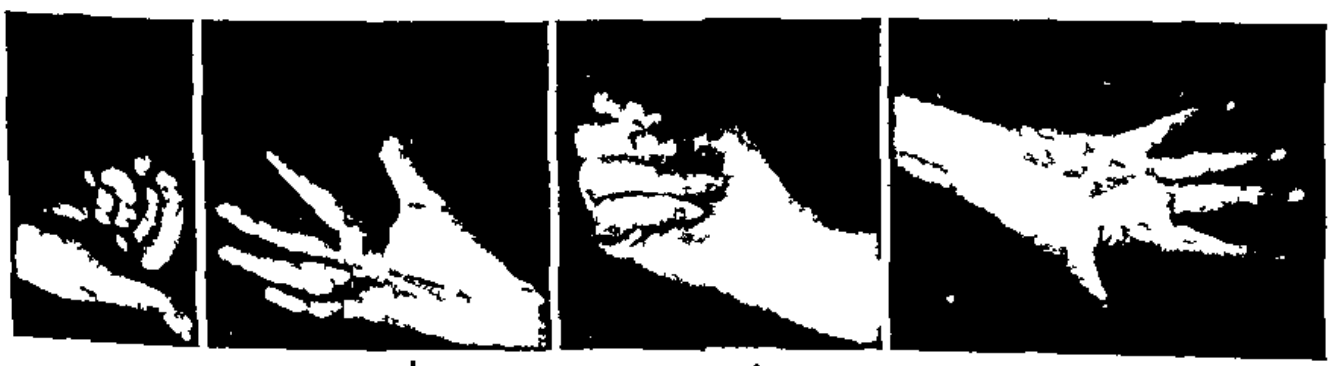
a *b*

Fig. 3. P. S. Se... months p... ously h... hand was ca... ght and held by a hot m... t... l r... ller... esulti... g n... a deep co... tracting p... limar sca... adh... r... t... t... the tendons and p... enting exte... on of the fingers as shown.
Op... at... The sc... r tissue was... sed a... d the denuded r... so... l ft was c... ered th skin from... tub... l r pedicle f... m the chest as sho... n *b*.

functionating positions so that the hand can be used much will have been accomplished as the mere use of the hand together with the time factor will greatly increase the range of motion.

When a hand has suffered a severe traumatism or an infection and especially if splinted during the recovery the tissues about the finger joints as well as all of the tissues of the hand have become thickened and less flexible and we find much loss of ability to flex the fingers. It is frequently found after palmar infection that the metacarpophalangeal joints have become permanently stiffened in the extended position and that the two distal joints of the fingers have become flexed. This is the position assumed because the same mechanics take place as in paralysis of the ulnar nerve. The small hand muscles normally flex the proximal joints and extend the distal two joints and when bathed in palmar infection they temporarily cease functionating and the fingers assume the opposite position just as they do in ulnar paralysis.

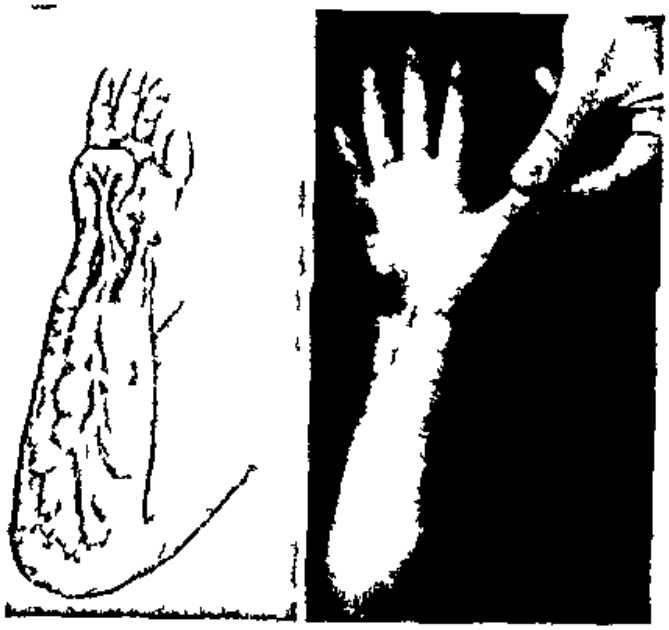
Stiffened finger joints may be mobilized by using the principle of slow steady mild traction much as the dentist draws into line malplaced teeth. If the traction is too severe the tissue strain thus produced will cause arthritis and pain. The restraining tissues must not be merely stretched as this only further stiffens the joints by provoking tissue reaction. The tissues must be held on a mild stretch steadily for weeks until they grow longer. The pump



b *c* *d*

Fig. 4. I... M... Te... m... nth pre... ly th... h... d wa... burned by be... g... ught i... m... ngl... The... l... t... l pa... t... f th palm... n... l ding the palm... fasc... l... ghed... nd the area... h... d bee... l ter... c... red b... poo... ped... l... k n graft. Th... h... od a... se... n... n... 1*b*... h... s fle... n... n... l... t... m... h... l muted. Th... r... t llat... co... tra... t... g... k... l... i... the palm dra... g togeth... th... th... mb... l... l g... rs. Th... graifted sk... i... d m... l k... d... bes... t... t... l... k. Th... fl... rt... n... l... h... l l b adhes... on... th... j... lm... l... t g... rs.

Oper... All f... th scar ti... u was d... sected o... t of the palm incl... d... g that wh... h matted together the deeper structures. Th... t... n... l ns w... re stripped well... to the fi... gers... n... l m... l... l zed... A tub... la... ped cl... wh... h had been p... pa... ed an... l t... ken f... om the abd... men was used to f... rm h... good... l... n... f... r the palm. A... pl... nt h... ld the fingers in ex... te... Th... result... bta... ed... flexi... n and e... ten... on of th... f... g... rs... nd... n... w kin... th palm... t shown in... d... d t... ken 6 m... ths later.



a *b*

Fig 5 P W Age 21 months Three months previously the hand and forearm were burned by hot coals resulting in keloid formation and contracture as shown in a Operation The scar tissue was excised and the hand was placed in a previously made metal splint which held the thumb little finger and wrist in extension The skin of the upper half of the forearm was extensively undermined and the edges were drawn together forming a linear scar across the dorsum as shown in b A keloid free graft of skin from abdomen was sutured to the little finger and part of wrist The latter became pigmented The thenar eminence was closed by lifting flaps and the lower half of the forearm successfully by a Thiersch graft from the mother's leg Except for the pigmentation of the Wolf graft which does not occur in pedicle graft a good result as shown in b

handle method traumatizes microscopically and results in increased scar contraction of the restraining joint capsules Elastic traction by its vibratory fluctuation traumatizes Steady firm traction is preferable It is well to remove the traction for short intervals several times a day to exercise the joints and bathe the hand in hot water

If adhesions prove too unyielding for the slow traction method the joints may be flexed under anesthesia and held so until the traumatic reaction is over

The wrist joint which tends to be straight can be drawn into the extended position by the Jones cock up splint This is the position in which a wrist is most useful and in which we generally use it

The metacarpophalangeal joints can be flexed in two stages The first is by a padded metal splint on the back of the hand bent at the knuckles (Fig 17 *D*) It presses the fingers and wrist palmarward while a palmar cross-bar under the head of the metacarpals draws these joints backward As an encircling web belt and buckle are tightened the joints are made to flex After about a week when partial flexion has been obtained the joints are bent still further by means of a kid glove (Fig 17 *F*) The finger joints are drawn into flexion by strings from each finger tip which are made fast to a line cleat that has been riveted to the wrist of the glove To flex the finger tips still further a flattened bracelet about the hand will hold the strings into the palm Individual fingers may similarly be flexed by fastening the string to them with adhesive and anchoring it to a web belt about the wrist by means of a safety pin used as a line cleat

To flex the distal finger joints a narrow web belt may be made to encircle the proximal and distal finger segments (Fig 17 *B*) A nail can be passed under the belt to keep it from slipping off the finger This belt may include all of the fingers and another belt may encircle the middle segments and the dorsum of the hand for flexion of the proximal joints also

If the finger joints have ankylosed too firmly they will not yield to mild force Greater force will result in evulsing two discs of cartilage from the proximal joint surface

If the extension of the finger is desired and the flexion is extreme the finger tips can first be drawn out by tape loops on traction cord from a distal metal extension of a Jones cock up splint (Fig 1 *b*) If flexion is *not* so extreme they can be still further extended by drawing the fingers into small curved metal gutter splints on their volar surfaces by belts encircling at their middle joints Another way is to draw the fingers into extension by tape loops from a splint belted along the dorsum of the hand and forearm

The final straightening of the fingers can be done by what I call the safety pin splint (Fig 17 *A*) It consists of two rods and two ribbon cross pieces of sheet metal soldered to them and is placed on the volar surface of the finger A web belt over the dorsum of the finger is looped about each rod and draws the finger forward between the two rods until it is straight



b *d*

Fig. 6. RIGHT. A year previously the hand was caught up to the wrist between two steel rollers causing multiple fractures exposing the flexor tendons and tearing away the muscles. The wound healed in 6 months and physiotherapy was used for 5 months. The hand was completely disabled. He could not grasp an object however lightly with any way of holding. Pressure between his hand and anything else. The wrist was fixed and the proximal phalanges were flexed to 60 degrees and held in the position of adduction. The fingers were quite stiff. The thumb locked in front of the fingers. *b* and *d* show the extent of flexion and extension.

Operation. Mitten grafting the proximal finger joints into flexion by the two-stage method (Figs. 7, *D* and *E*). The cicatricial tissue was dissected from the palm and forearm and from between the tendons, nerves and blood vessels. Ischaemic which were matted solidly together the edge of the ulnar nerve, which was found between the end of the nerve to the third digit was bridged by a free graft from the sural nerve. The flexor tendons freed from scar were implanted pulling the fingers into flexion. The wrist was put into extension and the thumb abduction. The large skin defect was covered by a tubular pedicle from the chest (*c* and *d*) taken 4 months later, showing fairly good extension and flexion of the hand. The thumb touched every finger. See sat out turned in the third cleft. Here turned to back.

This splint is also useful in straightening fractured phalanges.

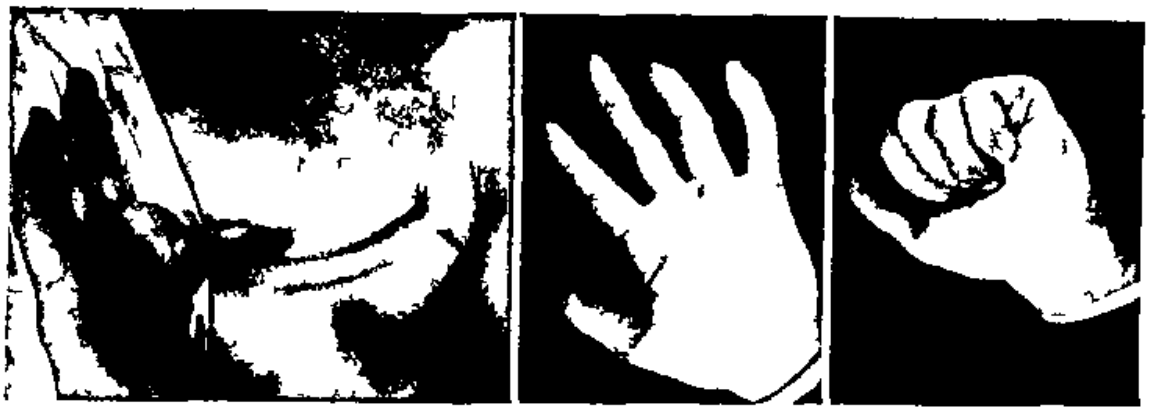
In some cases the joints are limited in their movements by adherent tendons or scar contractures and it will be necessary to liberate or excise these before the joints can be mobilized. The distal end of a flexor sublimis tendon severed at the base of a finger will



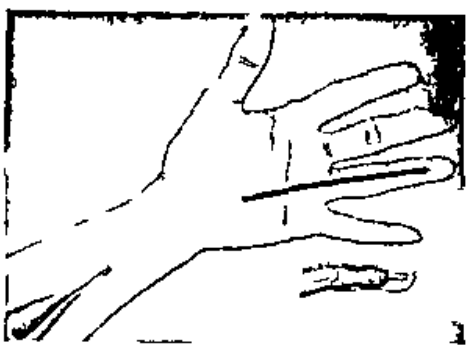
b *c* *d*

Fig. 7. CASE 8. Scar contracture of the thumb from the attachment of the [illegible] finger. *a* and *b* [illegible] of the thumb and fingers.

Operation. The contracted scar was excised, the hand was placed in extension and a pinch graft from tubular pedicle the chest was used to cover the defect. *c* and *d* show the result.



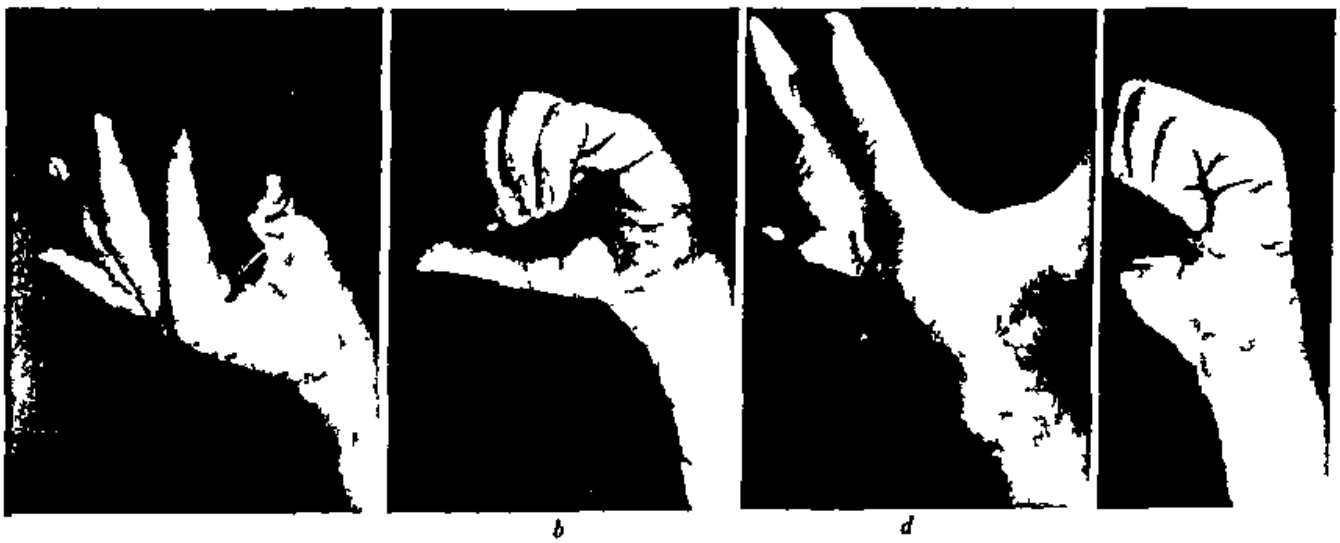
a *c* *d*



b

Fig. 11.—Case 1. A fistula in the palmar surface of the index finger which passed through the median line of the base of the finger resulted in loss of the flexor tendons and the cartilage of the finger which is shown in the accompanying illustrations.

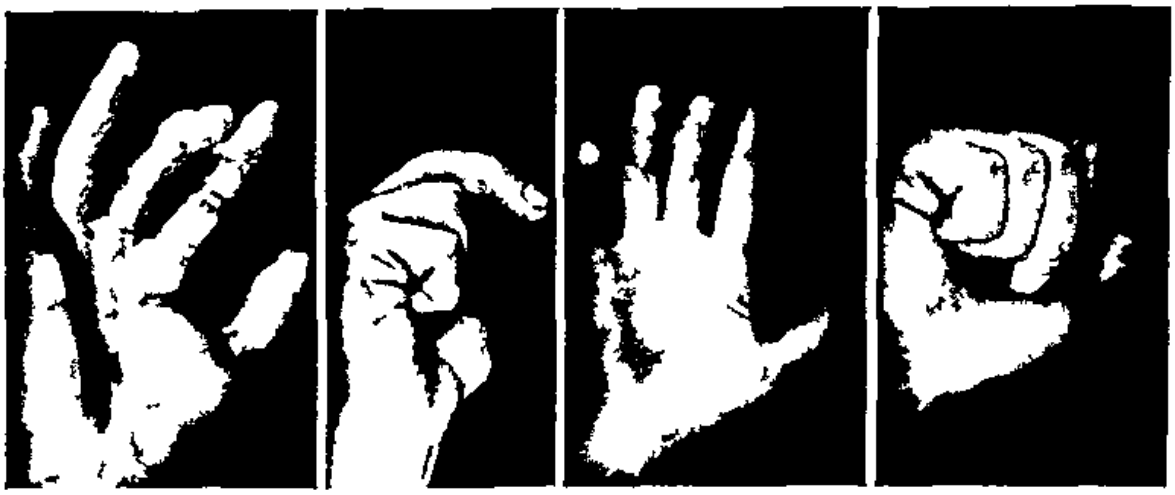
Operation.—The cavity was removed from the ulnar surface of the finger, leaving the wall of the fistula intact. The defect was covered by a skin graft from the abdomen. Four months after good skin was supplied to the affected area by transplanting into the pectoral region and then in the palm. Four months after the graft from the abdomen was transplanted into the palm it was found that the tendons of the flexor profundus had disappeared and the insertion of the extensor tendons was shown *b* and *d* taken three months later. The result is satisfactory. Some paralysis will be obtained.



b *d*

Fig. 12.—Case 1. The palmar surface of the index finger showing the scar as shown *b*.

Operation.—The scar tissue in the tendons of the wrist and fingers was dissected from the deep tissues. These reduced tendons carpi radialis brevis was united together. Between these reduced and the tendons of the second and third fingers was a gap of ½ inches and the third finger was bridged with a graft from the palmaris longus tendon. The function of the hand was restored.



a b d e



Fig 13 J D T Fourteen months previously the long finger was caught between two arches Severe tenosynovitis followed middle phalanx space infection resulting in a rigid extended flexor tendon adherent to the dorsal cicatrix of the long finger The finger had been further damaged by operations which the child had tolerated and a tendon lengthening operation was now necessary Incision through the scar by plastic gradually deepening resulting merely added more cartilage to the finger and did not increase the limits of extension and flexion in the finger when more radical procedure with the usual result of the medial longitudinal incision

Operation The scar tracture lengthwise of finger was excised and the wound closed to a zigzag-gleinto elongation The flaps raised dorsally were transposed to the palmar defect and sutured to the prepared underlying tendon in the palm after the scar tissue had been excised from the tendon A subluminous muscle graft was sutured to the tendon to provide additional strength See diagram I did not show the resulting effect

Good tactile sense is acquired in the graft in several months

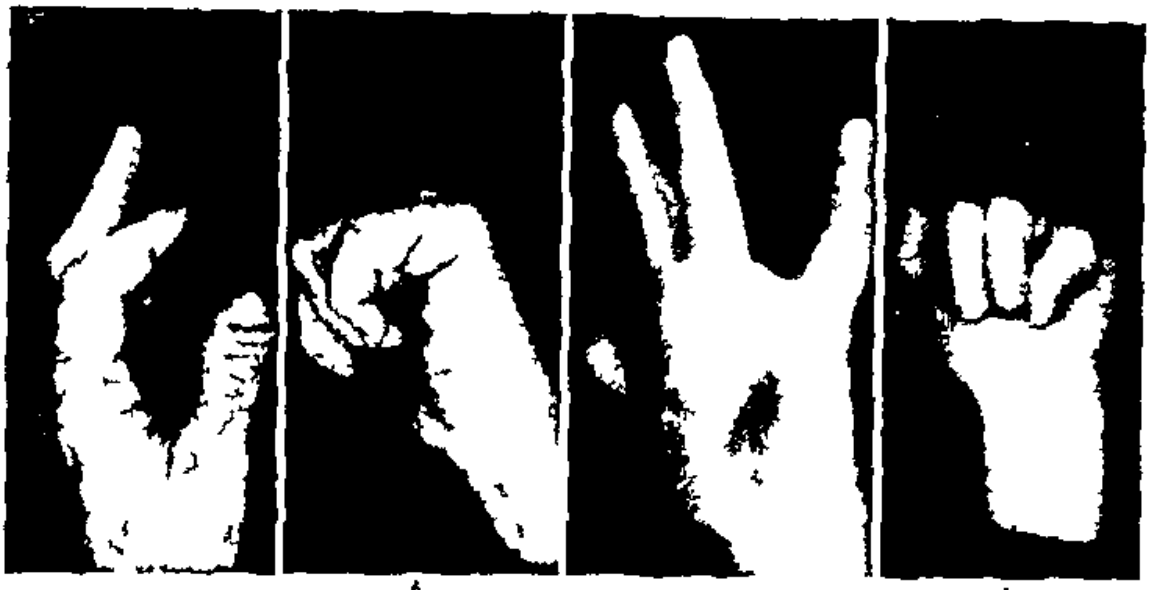
If the contracting scar is very superficial and there are soft tissues underlying a Thiersch graft may be used instead of a pedicled one If the contracting scar is very narrow it may be excised and by making parallel oblique cuts an inch or so apart alternately into each opposite skin edge undermining well and transposing the pointed skin flaps the resulting incision can be converted into a zigzag line which will when it later contracts merely pull straighter and not cause contracture (Fig 13 *c* and Fig 8 *c*) This is the best method of removing a short web between fingers but in this case the plastic is done in three dimensions

In all contractures in the palm it is best to remove the palmar fascia Dupuytren's contracture can readily be corrected by the above method and here the two lateral bands of contracting tissue must also be excised from the fingers distally to beyond their middle joints Foci of infection should also be removed in this case because of their role in the etiology

Keloid formation is racial but is also due largely to tension and usually when a keloid is excised and all tension is removed it will not reform It is surprising how a wide keloid scar will often soften up if a soft pedicle skin graft is made in it or across the line of tension Scars should wherever possible be placed crosswise to the lines of tension

INCISIONS

The median longitudinal incision is the one to be most avoided whether in the wrist palm or fingers as it leads to flexion contracture It



b *c* *d*

Fig. 14. Case II. A buzzsaw amputated the ring finger and severed the tendons and nerves of the three remaining fingers at their proximal segments. In a few seconds the resulting amputation stump of the extensor. The difference in the positions of the index and long fingers is due to the separate action of the long finger of only the central portion of the tendon. All the lateral portions pull around the middle joint and leave the distal joint. *b* is shown the lack of flexion as checked by the tensor tendons which are adherent to the scars.

Operation. The scars across the backs of the fingers were excised and the severed ends of the extensor tendons were freed. A scalp tissue graft was sutured to the tendon. The extensor tendon of the index finger was so adherent that a free graft was made about its full length. The finger from the specialized paratenon of the triceps tendon. Later as the graft could not be fixed completely the *extensions of the amputated ring finger were removed from the palm.* They had become adherent to the stump and so pointed the rest of the flexor tendons from being pulled upon by the flexor muscles as the sequel shown in Figure 21. Normal function was restored to the hand as shown in *d*.



d



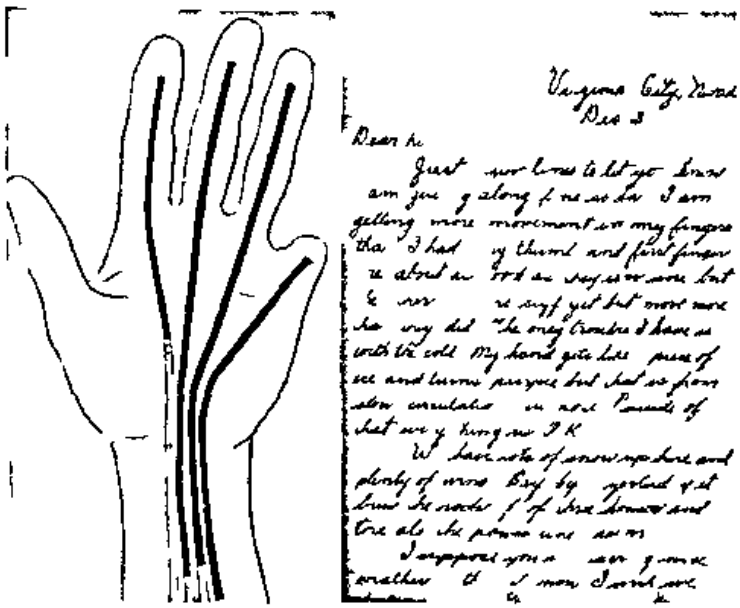
b

Case III. Three months previously the extensor longus pollicis tendon had separated from the broken bottle across the dorsum of the wrist. An attempt at restoration had been made but 2.5 inches of the tendon had disappeared. The resulting disability was total and the thumb was held in the palm.

Operation. The scar of the laceration and the deeper scar tissue were excised. *The bridging defect in the extensor* longus pollicis was 2.5 inches in length. The palmaris longus tendon was used for a free graft and grafted *b*. There was gratifying function from the first session and *d*.



a b d e



stated that he uses p k nd sl el d gs p t h l a d w ks a fast s the othe me A sampl f his writi g th thu ha d i ho n i f 4 m th ft ope ati n

Fg 6 W J age 9 N e m nths pre ously he touch d nth his l ttle fing a high powe ed wire d was nd red u c sciou G eat necrosis and fectio f ll wed in the hand nd fore rm pus was d sch rg d fo 9 month All of the flexor tendons in the hand sloughed out with th e cept on f the fle poll c s lo gus a d th be me densely ad her t So much kylo is r ult d that the wrist could not be xte ded the p oximal finger joints were fi d i the er tend d position and the d st l fi ge j nts h d pract lly n m ti n As the l mit f e t si n is h n n and f flexion in *b* it seen that the hand w s usel ss

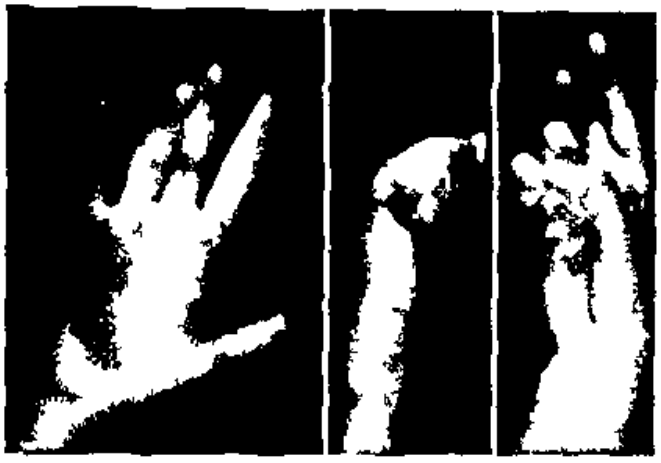
T tm t The j ts we e first slowly drawn by mild a d cont uo s tractio i t fu ct onating posi t o s th wn t i to e ten on by cock up splint a d the p o im l finger joi ts nt fl x n by the me sh wn i Figu 17 *Da* dl t in Figur 17 *E*

Op to The car tis e wa exc sed from w th n th palm a d f ea m emna ts of th flexor tend ns w e r m ed that f the thumb wa freed f om adhe on F u f ee te don grafts f m the l g ext s te d f the toes w e used to act s fl or p of d te l s fo e ch fing as hown d g m A v ry seful deg f f ncti n re turn d shown in *d* nd 7 m nths later He

makes a longer line for the formation of adhesions to the tendons and in the finger cuts the pulleys and makes adhesions and roughness in just the line where the flexor tendon should glide most smoothly

In the finger lateral or cross incisions do less harm and in the palm L shaped ones are preferable incisions following the lines of the palm are the least deforming Transverse incisions in the wrist and forearm and on the dorsal surface leave less disfiguring scars as they fit into the natural lines of the wrinkles of the skin Where an incision is apt to result in a contracture as in crossing a flexion crease it is well to zigzag it so its later shrinkage will be spent in merely widening out the angles

The greatest care should be observed to avoid injuring nerves as much of the function of the hand depends on the trophic condition and on the sense of touch The volar nerves in the fingers should be carefully spared In the palm the nerves lie just beneath the palmar fascia It is most important to spare the median motor branches to the



a *b* *c*

Fig 18 H I Age 14 years thrust through hand through wrist severing tendons both ulnar and median nerves the latter at flexor ulnaris and palmaris longus also all flexor tendons sublimis and profundus of all fingers

Operation Twenty four hours later the wounds were cleaned and primary repair was made in all of the severed tendons ulnar nerves and the latter sutured with powerful catgut Each finger can be flexed independently Sensation commenced to return in the hand 2 months after the injury and complete sensation returned in all but the ulnar side of the little finger which remained insensitive The hand shows perfect function except extension of the thumb which is lacking

thenar muscles as they run transversely across the inner part of the thenar eminence If cut opposition of the thumb is lost This often happens when incising for drainage in infection

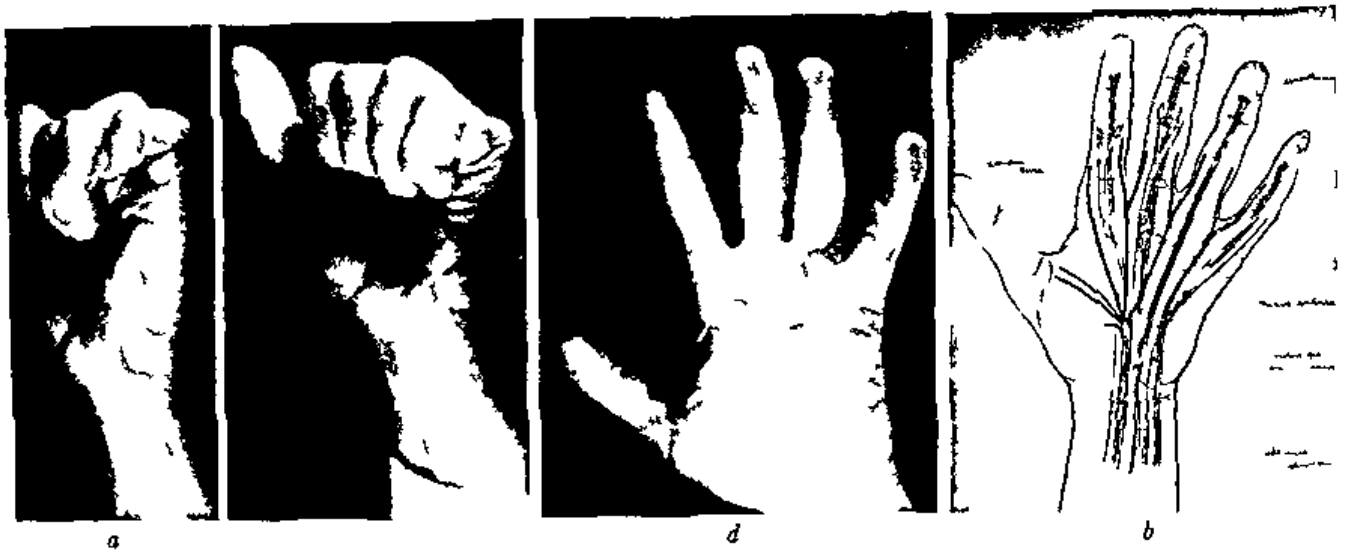
INJURIES TO NERVES

The nerves in the palm and the volar nerves of the fingers are as important as any other structure of the hand Unless this is realized the extremely tiny structures are often severed in incisions for drainage or in dissections of the hand resulting in loss of sensation and in trophic changes which affect not only the skin but also the joints and all the deeper structures One of the principal functions of the hand is that of sensation If the nerves of a finger *have been severed* surgical repair of the tendon should be delayed until regeneration of the nerves has been accomplished after nerve suture If this is not done the tissues will not heal well and if a tendon graft be put in it will not only become adherent but it will degenerate so that later it may break *It is perfectly possible to suture a nerve in the palm or finger I have done it 54 times and in each instance with gratifying success* In one instance all of the eight nerves at the bases of the fingers were sutured and every one regenerated Often the fingers must be slightly flexed to allow the nerve ends to be approximated but they can be allowed to gradually straighten out after a month Sensation to cotton and pin prick returns throughout the fingers in 5 months on the average It may start to return in a month and extends in this short time the length of a finger segment After a year even stereognosis may be present This satisfactory regeneration is due to the fact that the nerves in the hand are not mixed ones and so sensory axones are not lost in growing down motor pathways and vice versa Also the more peripheral an injury is in the *nervous system the better is the* repair *In* those cases in which the nerve to the thenar muscles was sutured good function returned to these muscles and opposition of the thumb was restored In some cases a free nerve graft from the sural nerve in the leg was used to *bridge a gap in a nerve In these cases a fair* degree of sensation returned No harm resulted from the loss of the sural nerve In one *case a 6 inch graft in the ulnar nerve restored* sensation to the fingers (Fig 20 *c*) In another case a similar graft in the median restored sensation to the fingers which commenced to return in 1 month Several other shorter grafts in the hand were also successful

Nerve sutures above the wrist though successful are not always as completely so because here the ulnar and median nerves are mixed ones and some of the fibers may grow down the wrong channel Thus in median nerve sutures sometimes opposition of the thumb does not return if the one tiny motor bundle of nerve is not matched exactly opposite its distal continuation In some of my cases it has however returned completely after suturing the main trunk of nerve (Fig 18)

Severing the median nerve practically wrecks the hand as objects can no more be felt by the special tactile surfaces of the thumb and first two and a half fingers and because the thumb assumes a position at the side of the hand and *can no longer oppose the fingers*

While a nerve is regenerating it is necessary to hold the muscles supplied by it in a state of



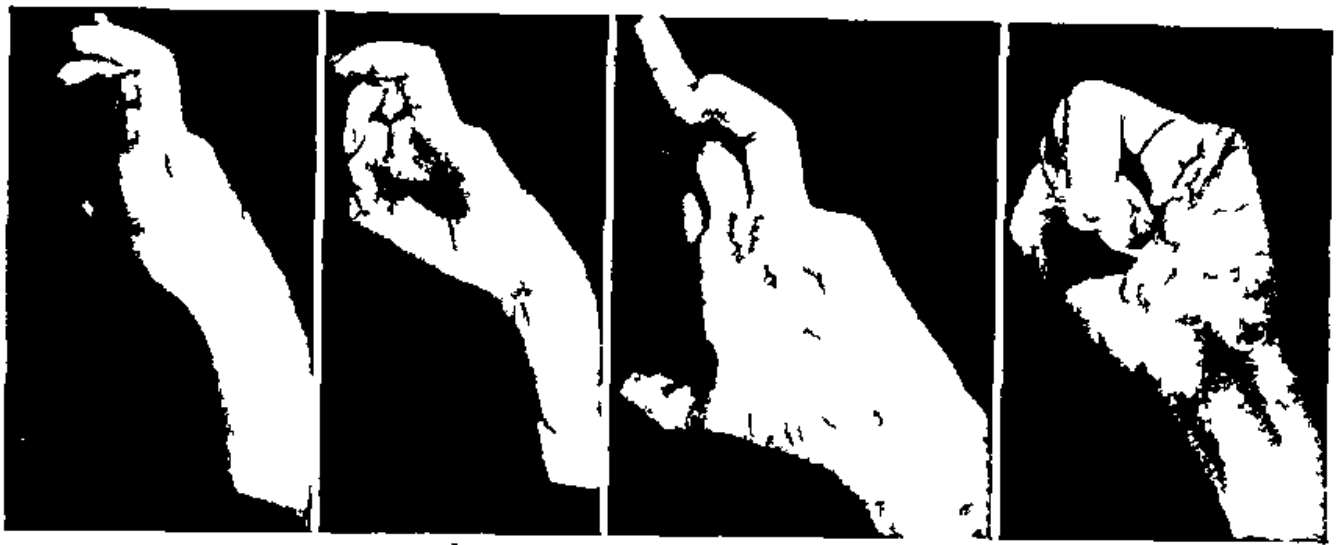
a *d* *b*

FIG. 9. HIGH. Four months previously he fell lacerating his palm with a broken bottle, severing the flexor sublimus of the long finger, both flexors of the ring finger and the nerves to the third and fourth digits. Infection followed, with sloughing of some of the tendons of the ring finger. The tendon of the little finger became infected, necessitating its removal. Only a scar tissue. The degree of flexion possible when compared with normal. *a*. The hand at rest to the palm, and clasping the radial half of the little finger all of the lower surface of the ring finger and the ulnar half of the long finger. *Operation*. The structures of the palm were dissected free from scar tissue. The ends of the median and ulnar nerves were found and separated from the half which between their ends were trimmed off to good nerve fibers and by flexing the fingers edges brought together and sutured with fine blood vessels, keeping neurally. The ends of the sublimus tendon of the little finger which separated and sutured. There was gap between the ends of the profundus tendon of the ring finger and the sublimus tendon had withdrawn into the forearm. One and half inches of the sublimus tendon was used as a free graft to bridge the gap in the profundus tendon. *b*. In 3 months sensation returned to a fair state in the middle areas of the fingers and in 5 months after the complete area. At the sixth month the wrist somewhat paralysis which was almost eating at the eighth month at which time tenogostic sensation ceased to return. Perfect function of the tendons restored. *d*

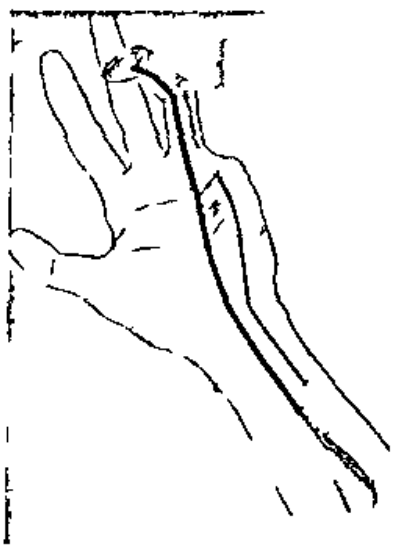
relaxation otherwise their function will not return. To do this for the thenar muscles in cases of median palsy has been a problem. It can readily be done however if a strip of one half inch adhesive plaster be looped about the outer side of the metacarpophalangeal joint of the thumb and made to draw the thumb into opposition (Fig. 17 *C*). The two ends of the adhesive are then brought around the ulnar side of the palm and wrist and applied to the back of the wrist and forearm for anchorage.

OPPOSITION OF THE THUMB

If opposition of the thumb cannot be obtained by nerve suture or if the thenar muscles have been destroyed function can be regained by a tendon transference operation. At first I tried using the sublimus tendon of the ring finger bringing it through the palm to a new insertion on the outer side of the thumb. This resulted in merely adducting the thumb across but did not make the thumb stand out forward from the palm for grasp. Next I used the palmaris longus with its prolongation of palmar fascia and ran it subcutaneously to insert on the outer side of the distal end of the metacarpal of the thumb. This combined with the former operation gave a fairly good result. In later cases better results were obtained by leading either the tendon of the flexor sublimus of the ring finger the flexor ulnaris with a free graft extension or the palmaris longus with its prolongation of palmar fascia through a pulley in the vicinity of the pisiform bone and then subcutaneously directly to the distal end of the first metacarpal. The pulley was made by using a free tendon graft from an extensor tendon of a toe as a loop through the origin of the flexor minimi digiti. The pull on the thumb was then mechanically in the correct direction and the results were excellent (Fig. 2 *d* and *e*). In cases where the thumb has assumed a flexed position when opposed to the fingers from lack of power of extension as in some cases of poliomyelitis the tendon which is to give op



b *d*



Fg J B K E ght m th pre ly th wri t w la rated th ul s de by a br k wi dshi ld ring th l rve d th fl o t l t the ring and littl fing rs S cha s e nfecti n f ll wed that the littl fing h d t be amp tated the se e ed tendo and 6 che f the ul a nerve came aw y th l gh Th r ma nd f th fl t d bec m adh e t j the p lm and fo c rm Th wrist j int becam fi ed in fl xn n th p xim l fi g r j t became fi ed in e tens on and the dist l finge jo nts h d pra t cally o mot o Th was anæsthesi sh n diagram *c a* and *b* sh w th limit f e te sion d fl xi f th wri t d fi g rs

T tm nt By muld d t t p es th wrist j t was b o ght t the cock p p ti and th p oxim l fi g r j nt were p t t fl xi by m thods sh wn F g 7 *D E* and *B*

Op t Th cut cars w e e cised nd th s tis was dissected f m with the ha d d f m T d freed f m dhes Th fl r te dons w e r mo d t ly f m th n g fi g r A g i ch f e t d n graft was t k from the te o f th se d toe d tured t the fle r muscles f th ri g fi ge th f arm p ed down th gh th palm a d th ri g fing r d tu ed to the di t l phala to act as the fl t d n as in diag m *c* A 6 in h l gth f the s l rv f m the m leg w d as fre graft to j the l rv in the f rm t th rve t th l st l ft the palm I j m ths h y t uch and p in c ld b f lt i the patche the wh le æs th t c a ea d t ch i ts p oxim l p rt I 5 mo th tt t h co ld be f lt th ugho t th In o m nth h w bl to id ntify g uze tt swab and th met l of k y r coin wh t ched t th In d f th ring fing P æsthes h d disappe ed The d gree of m t g ined m ths i h w in *d d*

position to the thumb can be attached to the tendon of the extensor longus pollici at the metacarpophalangeal joint The thumb *will then properly oppose the fingers*

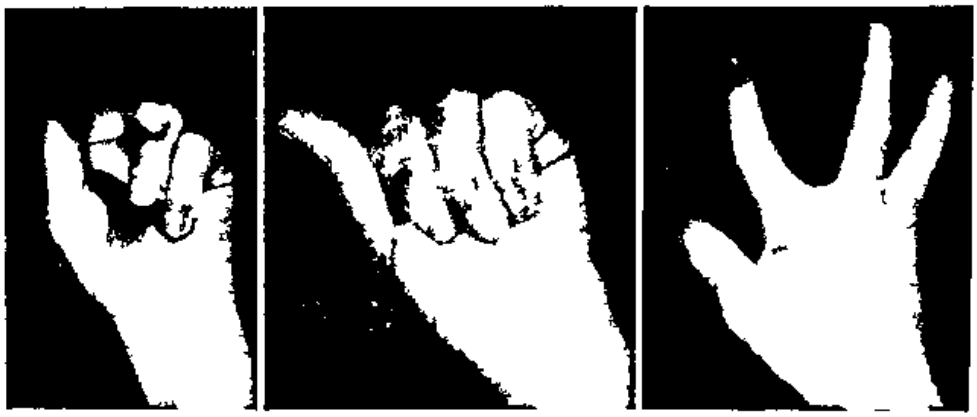
If no tendons are available the thumb can be placed in the position of opposition and held there by an ankylosis between the carpus and the metacarpus This is but a last resort however as motion is restricted and there is danger of fracture if the hand is caught between two objects

A better method where no tendons are available is to make a permanent check rein by a free graft of fascia from the distal end of the first metacarpal to the pisiform bone This will hold the thumb in opposition

OTHER CONDITIONS

Cases of finger thumb and wrist drop from musculospiral palsy may readily be corrected *by bringing some of the flexor tendons* around the forearm and attaching them to the extensor tendons For this purpose the flexor ulnaris can be used to extend the fingers the pronator teres to extend the wrist the flexor carpi radialis to extend the wrist or thumb and the flexor sublimus of the ring finger to extend the thumb

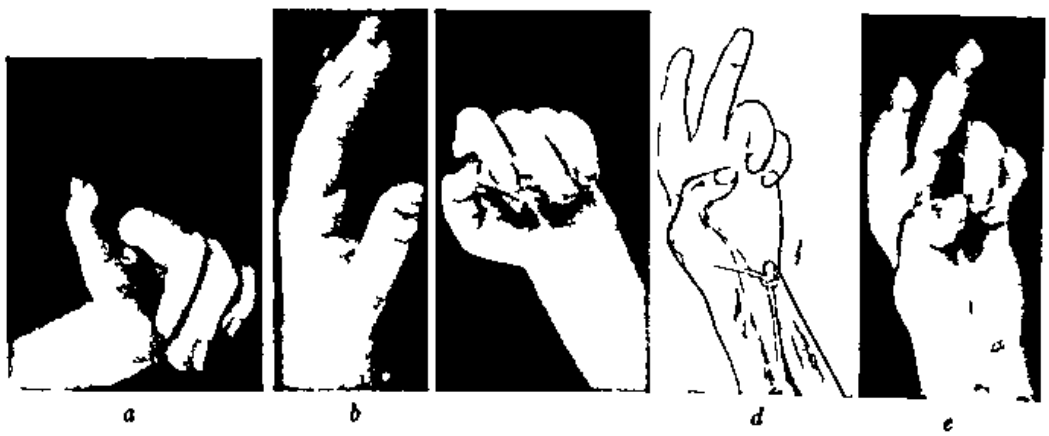
If the distal radio-ulnar joint is injured so that supination is prevented a small segment can be removed from the lower end of the ulna and thus make possible a complete degree of supination



a *b* *c*

F r C T H Sho ing the crossing of fingers in fl x d to an amput tion of th lo finge p oximal to its m tacarpal head Th adj g m tacarpals not ha g th s ppo t of the interv ening head r tate t ward ch othe palm ard exag g r t g th trans e se metacarpal arch and tilting the axi f the joints t w d each th r Sh wing lso limit tion of flexi n of the fing rs d to the fixati n f the fle te d n f the amputated fin e to the stump As th fl o t dons an f m practi cally a c mmon muscle the fixation f one tendon l mits th excursi n of the re t of the tend

Operat By ering the fle o tendons of the long fing in the palm nd by re mo ing the wh l f the thi d met carp l normal function resulted as hown in *b* d *c*



a *b* *d* *e*

F g 2 M V age 20 Infantile paralys at th age f 4 left her with paralys f the tensors of th fing d of th th m cles Sh h d no po of xte d ng th fing rs as shown i d ability t pp e the thumb ga nst the fi gers nd *a* Fle on of the thumb w s e y e k

Oper t Th t d n f th te sor c rp rad al bre is was tra ferred to pull o th t nd ns of the extenso commun s d git rum thus restori g th power f te si of th fingers a h wn n *b* Th t d f th fl ubl m s d mit rum of the ring fi er was tran f ed in its i ert n to the t don of the fl l gus poll c s th s gi i g tre gth to th m t f fl f th th mb Th t d of the palm ri l ngus t g ther w th its t n the palma fascia as passed th gh a p lley t the p if rm bo e made by f ee tend graft from t sor t d f th toe d passed on s bcut neou ly and i ted to the t nd n of the e te so longu pollici Good power f pposit n wa obtained s h wn

If there be poor tissue on the end of a finger stump it can be excised and good skin can be put in its place by a pedicle skin graft from over the pectoral muscle

After an amputation or injury of one finger it is occasionally seen that the rest of the fingers can be passively but not voluntarily completely flexed because the flexor tendon to the injured finger is fastened there and cannot be pulled As the rest of the flexor tendons spring from practically a common muscle the holding of one tendon holds to some extent the rest of them By severing the one tendon full flexion is restored to the other fingers

When a *long* or *ring finger* is amputated proximal to the head of the metacarpal it will be found that the adjoining fingers will extend normally but that when they flex they will cross far over each other This is because the mutual support of the heads of the metacarpals is missing thus allowing the adjoining metacarpals to rotate toward each other in their palmar aspect resulting in a tilt of the axes of the proximal finger joints The remedy is to resect the remaining portion of that metacarpal (Fig 21)

The amount of work one can accomplish in a hand in one operation is limited by the time it is safe to maintain ischæmia Dissection of the hand is so dangerous and difficult when the blood is flowing that all of that part of the work including nerve suture repair of pulleys tendon sheaths and tendons is best completed before the tourniquet is released As the time necessary to accomplish this in cases where several tendon grafts and nerve sutures are to be done *is surprisingly long it is compulsory* to work rapidly Even then several operations may be necessary to repair a badly damaged hand

The question will arise as to how much a hand may be injured to be beyond repair If the finger joints are ankylosed until we can make new joints it is best to remove the finger as it will stand out in the way in work (Two recent arthroplasties of proximal finger joints were very satisfactory)

If there be an annular scar about a finger interrupting the nerve and blood supply the part distal to the scar had best not be operated upon as partial necrosis will result

If the nerves of a hand are damaged beyond repair not much can be expected in reconstruction

A hand may be too much damaged by infection for its tissues to be fit for repair When a severe storm of infection has passed through a hand the resulting tissues are hard and shrunken from the contracting scar formation the joints are stiffened and the tendons are adherent The infection has followed the paths of nerves and blood vessels and the resulting scar contraction has so strangled them that the tissues supplied have become atrophic and congealed The greatest damage is done in the closed spaces as under annular ligaments in the tendon sheaths and in the fascial spaces where swelling is limited and necrosis from both ischæmia and infection results Such a hand in which the nerve and blood supply is no longer sufficient and in which the tissues are congealed may be unfit for repair

NOTE—For the repair and the grafting of nerves and nerve ends in the hand which has purposely been omitted this article the reader is referred to Surg Gynec & Obst 9 8 July and 1922 July

UNDESCENDED TESTICLE

Operative Treatment and End Results

By CHARLES G MIXTER M D F A C S Boston
F m th S gic l f th Childr H p t l

THERE are several points that are still unsettled in dealing with the improperly descended testis the most advantageous age at which to attempt to place the testis in its proper site the immediate operative result to be expected from surgical interference and the development and function of the testis after its replacement My experience with this condition has been chiefly in children and in reporting this series of 207 instances of undescended testis I have included no case over 12 years of age Of these 106 were operated on by my associates at the Children s Hospital and the remaining 101 were operated on by myself and comprise all cases treated at the hospital during the last 15 years with the addition of cases of children from my own records It has seemed better to consider children only in this discussion so that it may serve as a basis of comparison with results obtained in other series chiefly composed of cases operated on after puberty

During the last 10 years 1 782 cases of inguinal hernia have been operated on and of these 7 1 per cent had an accompanying maldescent of the testis This percentage very closely coincides with Coley s statistics at the Hospital for Ruptured and Crippled Bilateral ectopia occurred in the proportion of 1 to 3 2 of the unilateral variety

During the later months of fetal life an evagination of the peritoneum the processus vaginalis extends into the inguinal canal and this is followed normally by the descent of the testis into the scrotum in the seventh to eighth month Very frequently the descent is delayed and it has been established by Wrisberg that as high as 30 per cent of newborn children have undescended testes In the majority of these the migration of the organ is completed in the first few weeks after birth The gubernaculum testis a muscular structure during fetal life which atrophies after the descent of the testis is attached to the epididymis while it lies within the abdomen and extends down the inguinal canal After emerging from the external inguinal ring the majority of its fibers continue down into the scrotum while other bundles pass inward and upward on to the abdominal wall others dip deeply downward into the perineum and still others spread out on the anterior surface of the thigh It is along one of these latter paths that the aberrant or ectopic testis must descend

On completion of the descent of the testis fusion of the surfaces of the processus vaginalis takes place throughout its extent except at the lower end where the tunica vaginalis is formed As descent of the testicle must take place before fusion of the surfaces of the processus vaginalis can occur in the process of development a congenital hernial sac is always found accompanying a true undescended testicle On the other hand with an ectopic testis of either of the three varieties superficial abdominal perineal or femoral a congenital hernia need not necessarily be present

A position of the testicle not infrequently seen is one in which the testis is at the external ring and by traction can be brought down to the entrance of the scrotum The scrotum does not have the typical shrunken appearance At operation no hernial sac is found and an open pouch is present in the scrotum instead of the entrance being completely blocked by firm adhesions that require considerable force to separate This I believe is not a true undescended testicle but one in which the cord is short Probably it is this type that has been reported as descending into the scrotum spontaneously and if on examination it can be identified as such operation should be deferred until after puberty in the absence of symptoms It is difficult to believe that a true undescended testis accompanied by a congenital hernia can descend behind the sac to which its anterior surface is firmly adherent or

drag the abdominal peritoneum through the internal ring and inguinal canal and force its way in to the scrotum through an entrance blocked by dense adhesions

Many theories have been advanced to explain the arrest of the descent of the testicle The two having the most evidence to support them are *first the theory of a fetal* peritonitis advanced by Cloquet and Wrisberg and strongly advocated by Beudinger and second the theory of heredity brought forward by Godard and supported by Uffreduzzi Beudinger maintains that cicatricial evidence will almost invariably be found at operation My own experience has been that puckered cicatrices can be demonstrated within the hernial sac overlying the cord near the internal ring in a number of instances but I have seen the same scars in congenital herniæ unaccompanied by cryptorchidism Coley states that he *has found no evidence in support of a fetal* peritonitis in his large series of cases and with Uffreduzzi believes that heredity is the underlying factor Certainly the familial tendency to this defect is marked and the condition is similar to that found in certain animals where descent of the testis does not take place and it has therefore been interpreted to represent a sign of arrested development

Uffreduzzi emphasizes the frequent presence of other stigmata of degeneration We have found these very frequently present with bilateral cryptorchidism but with unilateral *defects other evidence of mental or physical* retardation of development has rarely been noted

The pathology of the undescended testis is a diminution in number and degeneration of the cells of the tubules and a thickening of the basement membrane and tunica albuginea The interstitial cells are increased It is the internal secretion from these cells that establishes the secondary male characteristics It is *stated by Caulk that they also may degen*erate later on and the testicle be replaced by an atrophic nodule of fibrous tissue Double cryptorchid rarely have the power of procreation and when present it is generally short lived the duration of fertility being usually less than a decade after puberty Occasional instances have been reported of long continued fertility but *spermatogenesis is un*usual probably in less than 10 per cent of the bilateral cases

Spontaneous atrophy of the testicle is more frequently encountered after puberty than in childhood It is said that figures can be juggled to show any required result Nevertheless it is interesting to note from the operative records that in this series of 168 cases atrophy of greater or less degree was noted at operation *in 10 per cent of the 90 boys between 6 and* 12 years and in 6 3 per cent of the 63 children less than 6 years of age In no case was atrophy noted in a child under 4 years

Interference with the circulation in childhood will produce atrophy Some 8 years ago in reporting a series of cases of undescended testis in childhood I found that where the spermatic vessels were divided atrophy practically invariably occurs Acute obstruc*tion of the circulation is frequent in adults* with undescended testicle about half the reported instances occurring in this type of case As arrested descent of the testis occurs in the proportion of one to 500 normally placed testes the preponderance of circulatory accidents occurring in the undescended testicle is very apparent At the Children s Hospital we have had two emergencies of this type one in a child of 8 months requiring orchidectomy and another in a *child of 1½ years in which* the testicle was saved Coley states in his conclusions The atrophy usually found in the undescended or maldescended testis is not the result of the malposition The change in structure and the atrophy are merely coincident being due to congenital causes In view of the fact that interference with the spermatic circulation will produce atrophy that extremely rarely at least is spontaneous atrophy observed *in very young children* that the percentage of such atrophy increases toward puberty and finally that due to its malposition the undescended testis is more prone to acute circulatory accidents it would seem that atrophy of the organ may be largely a result of interference with circulation occasioned by the malposition

The undescended testis appears more prone to undergo malignant degeneration than that *in which normal descent has occurred* Hin

man stresses the susceptibility of the ectopic testis to malignancy and emphasizes the difficulty of diagnosis particularly in the abdominal variety He emphasizes the necessity of orchidopexy or orchidectomy at or before puberty to obviate this danger Cunningham collected 452 cases of malignant disease of the testicle 40 occurring in ectopic testes showing that new growths occur over 10 times as frequently in normally descended as in imperfectly descended testes On the other hand if we remember that normal descent of the testicle occurs 500 times to 1 maldescent the great susceptibility of the abnormally placed organ is at once apparent Malignancy occurs most frequently during the period of greatest sexual activity To avert the possibility of malignant degeneration it would appear wise to attempt the replacement of the organ before the physiological changes incident to puberty begin Coley and Cunningham each report one instance of malignancy developing in a testis following the operation for undescended testicle which in each instance had been performed by another surgeon In Coley s case the new growth was present or developed shortly after the primary operation while in Cunningham s case it appeared after an interval of 5 years

New growths of the testis are relatively rare in childhood three cases having been encountered at the Children s Hospital during the last 10 years among 9 579 admissions to the Surgical Service for all causes In one child apparently presenting an abdominal ectopia as no testicle could be palpated in the scrotum or inguinal canal on the affected side a large inoperable malignant growth was present in the lower abdomen No necropsy could be obtained but presumably this was a new growth developing in the retained testis

Previous to 25 years ago the majority of patients presenting undescended testicles were advised against operation because of the poor results obtained In 1898 Bevan described the operation that has since been followed by satisfactory results in large series of cases As the operative results in the main are satisfactory operation should be advised for various reasons The mental balance of the patient with a malposition of the testical is often depressed and is relieved by replacement of the organ The accompanying hernia is frequently troublesome and dangerous and cannot be held in comfort by a truss Where a truss is worn serious damage to the testicle usually ensues The danger from circulatory accidents and the susceptibility of the retained testis to new growth should be removed By operation the normal anatomical conditions are restored and by this restoration it is possible that the spermatogenetic function of the testis may be retained

That the principles of the operation as described by Bevan are not rightly understood or closely followed by many surgeons is attested by the number of poor results that are seen Personally I have reoperated upon three cases within the year in which retraction had followed the previous orchidopexy but in which the testis did not show atrophy In all three instances the testis is now well down in the scrotum and is normal to palpation

Operative failures can be divided into three classes atrophy ensuing after operation at which a testis normal in size and consistency was found retraction unaccompanied by atrophy and atrophy and retraction occurring together Retraction is caused by insufficient lengthening of the cord and by the testicle being replaced in the scrotum under tension The cause of postoperative atrophy is interference with the spermatic circulation Bevan states that if sufficient length cannot be obtained by removing the fascial coverings of the cord and dividing the fibrous bands the spermatic vessels may be divided as the accompanying vessels of the vas which anastomose with the spermatic vessels will provide sufficient nourishment for the testicle As the spermatic vessels are almost invariably the short elements of the cord the greater length of the vas will permit the testicle to lie readily within the scrotum This procedure he states is only required in about 10 per cent of the cases Depending on this accessory circulation many surgeons use too little care in preserving the spermatic circulation and it is often sacrificed unnecessarily Although gangrene of the testicle rarely ensues in childhood atrophy of the testis almost invariably follows within a few months

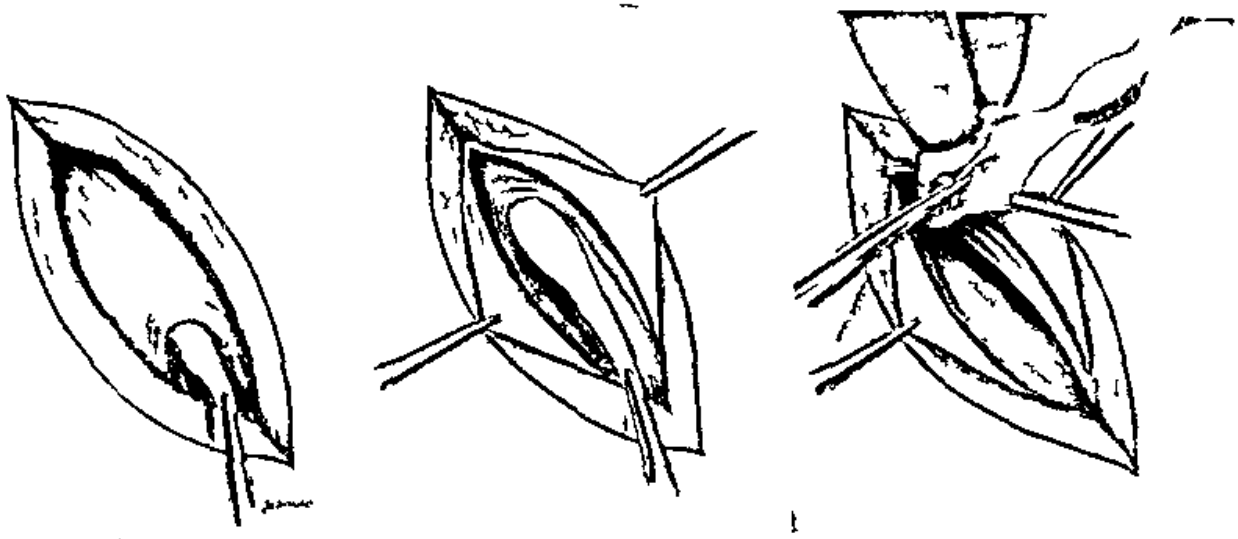


Fig 1 Fig 2 Fig 3

Fig 1 The usual oblique hernia incision is made
Fig 2 The aponeurosis is split the gubernaculum is freed and a pouch formed in the scrotum

Fig 3 The hernial sac carefully separated from the cord high up the utmost care being taken not to injure the permatic vessels

In view of the poor results that are frequently obtained by inattention to the details of this well devised operation it may not be amiss to describe the technique that has been satisfactory in my hands and differs in no essential from the Bevan operation

Operative procedure An oblique incision is made over the inguinal canal The aponeurosis of the external oblique is split from the external ring well beyond the internal ring The fibrous remnant of the gubernaculum continuing downward from the lower border of the hernial sac is freed from its attachment in the scrotum and a hæmostat applied to facilitate traction on the cord without traumatism to the testicle A pouch for the testicle is prepared in the scrotum by breaking up the adhesions with the finger The cremaster is divided and the sac opened high up near the internal ring exposing the testicle which lies seemingly within the congenital hernial sac Separation of the sac from the cord should be done with the utmost care as the vessels are spread out on the posterior surface of the sac as a broad band and any considerable injury to the spermatic vessels in childhood is almost invariably followed by a greater or less degree of atrophy The sac is cut across and ligated high up The cremaster and fibrous coverings of the cord are completely removed A tunica is formed from the lower end of the sac by a purse string suture of plain catgut Care is exercised never to handle the denuded testicle to obviate so far as possible the postoperative swelling

The internal ring is then dilated by the finger passed inward behind the peritoneum The vas will be seen leaving the vessels and passing downward and inward over the pulley like margin of the transversalis fascia the vessels continuing upward and inward Generally little difficulty is experienced in obtaining sufficient length to the vas and at times it may even form a long loop far down into the scrotum below the testis To ensure relaxation of the vas and improve the exposure for further dissection the transversalis fascia is split downward from the internal ring to the deep epigastric artery Division of the deep epigastric vessels or transposition of the testicle and cord behind them yield in my experience only an insignificant increase in length of the cord as the only structure to benefit by this maneuver is the vas with which there is rarely any difficulty

A narrow retractor is introduced behind the peritoneum beneath the upper margin of the internal ring and by finger dissection the peritoneum is lifted up from the posterior abdominal wall Then by traction on the hæmostat grasping the gubernaculum fine fibrous bands anchoring the spermatic vessels to the

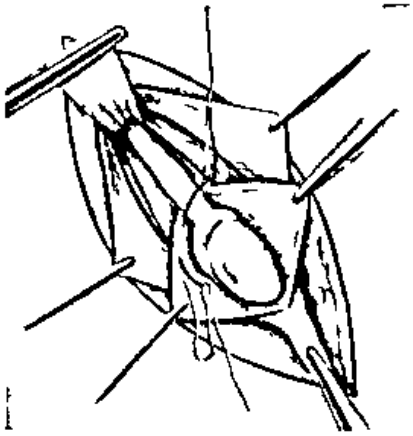


Fig 4



Fig 5

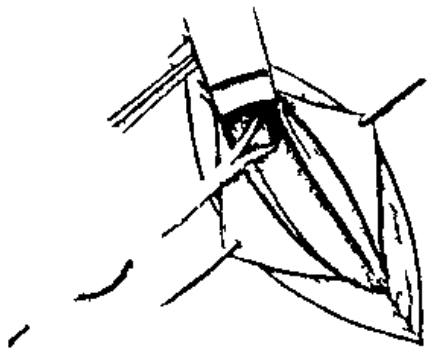


Fig 6

Fig 4 The sac is cut across and a tunica formed from the lower end of the sac

Fig 5 The pampiniform vessels are seen unmasked upward and inward and the hooking over the upper margin of the transversalis fascia and running downward and inward

Fig 6 The internal ring is stretched and by finger dissection the peritoneum is freed from the posterior abdominal wall When the peritoneum is raised upward fibrous band holding the spermatic vessels appear and are cut across

posterior abdominal wall are defined and cut or torn across These bands lie chiefly to the outer side of the vessels When the cord is sufficiently lengthened to permit the testis to lie without undue tension in the scrotum an unknotted temporary suture is taken through the gubernaculum and both ends are passed out through the scrotum and clamped to the operating sheet under tension care being taken not to produce a torsion of the cord when the testicle is drawn down The entrance to the scrotum below the spine of the pubis is closed over the cord with a purse string suture The abdominal wall is then repaired in the routine manner for closure of an inguinal hernia without transplantation of the cord The external ring should be closed snugly around the cord there being very slight danger of atrophy of the testicle from too tight a closure

To arrive at a satisfactory result in the operation for undescended testicle the greatest care and patience must be exercised The spermatic vessels are delicate and readily torn Atrophy is apt to follow a moderate degree of interference with the spermatic circulation No one step in the operation will give the requisite length to the cord but the sum total of the small gains accomplished by each step must be sufficient to allow the testicle to lie in the scrotum without undue tension Otherwise the testis will be found to have retraced to the external ring within a few weeks

The results obtained in this series of cases is best shown by the accompanying tables Unfortunately only 84 cases have been traced and none of these histories shed any light on the question of the ultimate fate of the testicle showing whether operation before puberty may aid in restoring the spermatogenetic function The testicle after replacement in the scrotum without interference with the spermatic circulation will apparently undergo the normal physiological changes at puberty The size and consistency are normal as is also the pain sensation on pressure but the proof of the development of spermatogenesis requires a large number of bilateral cases operated on in boyhood who demonstrate their fertility or in whom active spermatozoa in normal numbers are found after puberty A sufficient number of such individuals must be reported to more than equal the 10 per cent instance of frequency of fertility in the unoperated cases For this reason bilateral cases should be followed and the late results reported where possible

A result has been considered satisfactory where the testicle has remained in the scrotum following operation and atrophy has not ensued Very slight variations in size from the unoperated normal testicle have not been called atrophy Where however the testis has diminished to three fourths the normal size or less or has lost the normal firm consistency it is classed as atrophic Where the testicle is

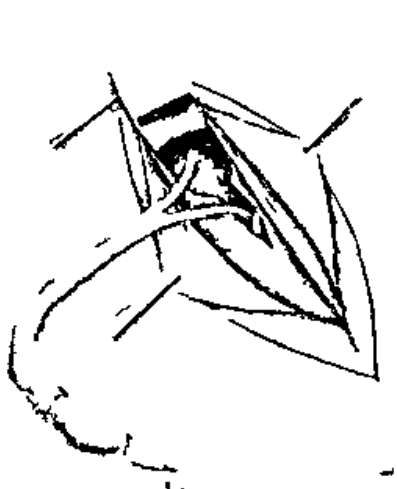


Fig 7



Fig 8



Fig 10

Fig 7 The transversalis fascia is split downward to the deep epigastric artery

Fig 8 A temporary suture placed through the eminent fold of the gubernaculum or lower end of the sac and passed through the bottom of the scrotum and clamped under to the operating sheet

Fig 10 Classical manner of removing the gubernaculum from the tract to which it is attached

found to be atrophied at the time of operation and no improvement is noted even though the organ remains in the scrotum the result is classed as unsatisfactory These cases have slightly raised the percentage of unsatisfactory results perhaps unfairly

An unsatisfactory result from subsequent atrophy may be caused by the accidental tearing of some of the spermatic vessels at operation from unnecessarily rough handling by including a portion of the vessels within the suture when the attempt is made to anchor the cord to Poupart s ligament or when the spermatic circulation is tied and sectioned unjustifiably from lack of patience In a certain number of cases particularly in the intra abdominal variety it is necessary to deliberately cut the vessels to permit the testis to be placed in the scrotum Although atrophy and aspermatogenesis will almost certainly ensue it is better to have a testicle of this character in the scrotum than in the groin or abdomen where strangulation or the development of a new growth may occur

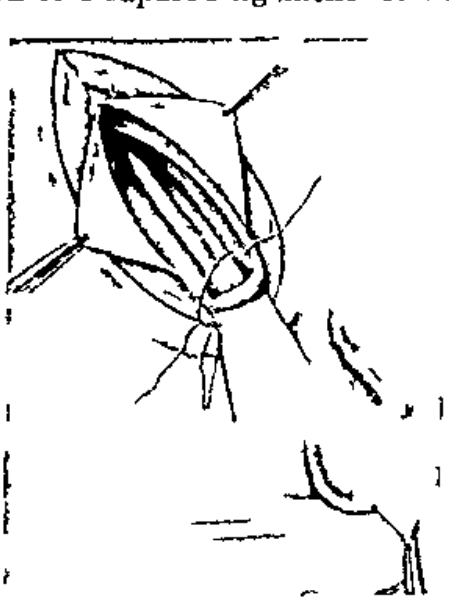


Fig 9 A puncturing trocar closes securely the entrance to the scrotum between the sand bags

An unsatisfactory result from retraction in variably means that there was undue tension on the cord after reposition of the testicle Either the vessels had not been sufficiently freed retroperitoneally or the vessels themselves were so short that they should have been tied and cut Rarely the vas seems to be the cause of difficulty In such a condition I use a modification of Davison s technique in which he cuts the deep epigastric The transversalis fascia is split downward to the pubic spine and the deep epigastric is mobilized and the testis and cord drawn downward beneath it This definitely lengthens the vas

Retraction when it occurs frequently becomes evident before the patient leaves the hospital in from 2 to 3 weeks Atrophy is definitely noticeable in from 3 to 6 months in the majority of cases

The operation for undescended testicle may be performed at any age with a good prospect

for a satisfactory result should the indication arise The best time is between the ages of 5 and 12 years In very early childhood the structures are so delicate that vessel injury followed by atrophy is difficult to avoid

Regarding the position of the testicle at the time of operation the lower the testis has progressed in its descent the better the outlook for a good result

As Coley pointed out the occurrence of the superficial abdominal type of ectopia is far more common than was formerly believed In the accompanying tables the four cases mentioned under the heading of ectopia are undoubtedly incorrectly classified because this type of maldescent was not recognized at operation In general one may expect a satisfactory result in 75 to 80 per cent of the cases coming to operation These figures are derived from the outcome of operations performed during the last 8 years as previous to that time the importance of preserving the circulation to the testicle intact was not fully realized The 78 per cent of good results obtained over this period very closely correspond to my own series of 101 operations over a period of 15 years during which time every effort was made not to impair the spermatic circulation Of 61 operative results examined 79 per cent showed a good result In the intra abdominal variety only about 50 per cent will prove satisfactory because of the frequent necessity of depriving the growing testicle of its main blood supply

An interesting fact brought out by a review of this series of cases has been that in 7 instances where the testicle was deemed slightly atrophic by the surgeon at the time of operation a subsequent examination of the testicle after a lapse of months or years has revealed an organ apparently normal to palpation If this observation is substantiated it would be an added argument of considerable weight for early operative interference

Though the operation for undescended testicle is a fairly long procedure to which to subject a child and should be carefully and painstakingly performed to assure a good result it is accompanied by very little shock In practically all bilateral cases I believe both sides can be safely operated on during the one

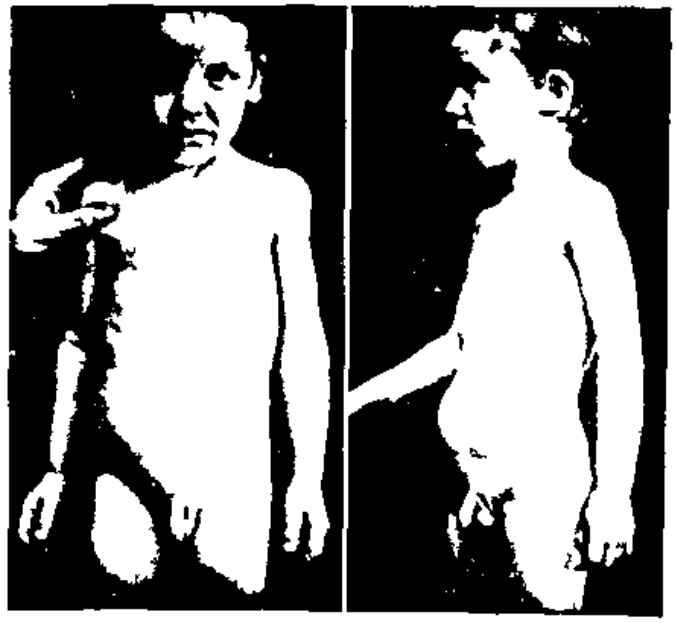


Fig 11 Example of superficial abdominal ectopia with average congenital hernia

TABLE I—PREOPERATIVE DATA

	Number of cases
Cases operated upon	168
Testicles operated upon	207
Involving right side	75
Involving left side	54
Bilateral cases	39
Position of Testicle at Time of Operation	
Intra abdominal	24
Inguinal canal	129
External ring	56
Ectopic	4
Unclassified	4
Status atrophied at operation	5
Age at Operation	
Before 4 years	33
4 to 8 years	64
8 to 12 years	7

TABLE II—END RESULT DATA

Total number cases reported giving information	87
Total number of operative end results examined	107

Age at Operation	Result Satisfactory	Result Unsatisfactory
Before 4 yrs	9	6
4 to 8 yrs	3	10
8 to 12 yrs	32	18
Total	73	34
Per cent	68	32

anesthesia One fatality mars this series A baby of 16 months with a large troublesome hernia accompanying a unilateral ectopia did well for 10 days following operation then developed anuria and died in 36 hours This gives us an operative mortality of 0 5 per cent In no instance has a recurrence of the hernia been noted

TABLE III—RESULTS DEPENDING ON POSITION OF TESTICLE AT TIME OF OPERATION

Position of Testicle	Unsatisfactory Atrophy	Unsatisfactory Retraction	Satisfactory High in Scrotum	Satisfactory Low in Scrotum	Percentage
Intra abdominal	5		4	3	58
Inguinal canal	7	5	18	3	69
External ring	3	4	4		72

In one instance testicle was replaced in abdomen at operation

Atrophy following attempted preservation of spermatic circulation

	No Atrophy	Atrophy	Percentage
Vessels divided	2	13	84
Partially cut		5	
Not cut	68	9	2

No entry made in 8 cases in which the testicle remained undoubtedly atrophic and no change has resulted following operation

TABLE IV—RESULTS IN PATIENTS TRACED

Time Elapsed Since Operation	Satisfactory Results	Unsatisfactory Results
2 months to 1 year	5	
1 to 2 years	11	7
2 to 5 years	22	6
5 to 10 years	22	16
Over 10 years	3	3

END—RESULTS OF OPERATIONS SINCE 1904

Position of Testicle at Operation	Results Satisfactory	Results Unsatisfactory
Intra abdominal	6	3
Inguinal canal	38	7
Ectopic ring	8	5
Total	52	15
Percentage	78	

SUMMARY

Operations for undescended testicle in childhood may be expected to yield 75 to 80 per cent of satisfactory results that is to say the testicle remains in the scrotum and subsequent atrophy does not ensue

To attain this result the spermatic circulation should be preserved and the cord lengthened sufficiently to allow the testicle to be placed in the scrotum without tension

In a certain number of cases in particular those of the intra abdominal variety it will be necessary to section the spermatic vessels Where this procedure is unavoidable atrophy occurs in 85 per cent of the testes It is indicated in only about 10 per cent of all cases

Atrophy may ensue where the spermatic vessels are not divided This is probably due to accidental tearing of some of the trunks at operation or inclusion in the stitches if the cord is anchored to Poupart s ligament

Operation may be undertaken at any age with the expectation of a good result if the accompanying hernia becomes troublesome or other indications arise

The preferable age for operation is between 5 and 12 years At an earlier age the structures are so delicate that injury to the spermatic vessels is difficult to avoid

Orchidectomy should not be done in childhood Replacement of the testes in the abdomen should also be avoided on account of the risk of a future malignancy In even the most difficult case section of the spermatic vessels and transposition of the vas and its accompanying vessels behind the deep epigastric will make it possible to place the testis in the scrotum

The examination of the cases that have been operated on in childhood with preservation of the spermatic circulation and have passed the age of puberty frequently reveal on palpation a testicle that has apparently developed normally

From this series no light has been thrown on the spermatogenetic function of the undescended testis subsequent to an operation performed before puberty It is hoped that later the bilateral cases of this type may afford some valuable data

In no instance has a recurrence of the hernia been observed

CARCINOMA OF THE STOMACH IN YOUNG PEOPLE[1]

By RAYMOND P SULLIVAN M D F A C S New York

THE following discussion of carcinoma of the stomach in the young was suggested by a personal observation in a young man of 22 years and is restricted to the occurrence of the disease in the first two and a half decades of life

CASE REPORT

(No 1249 1922 St Vincent s Hospital) John M a student age 22 years was referred to the writer March 22 1922 The chief complaints were (a) epigastric pain of 4 months duration and (b) loss of flesh strength and weight

Present illness Up to 4 months ago he enjoyed good health when he began to complain of a dull epigastric pain coming from 1 to 2 hours after meals and lasting for indefinite period This pain was usually relieved by food ingestion or alkali At first vomiting occurred shortly after eating often before the onset of pain The vomitus consisted of undigested food but never any blood There was considerable gas belching immediately after and between meals Recently the pain had become more intense and prolonged with radiation through to the back on several occasions There was never any associated jaundice The bowels were irregular and the appetite good but the stomach distress appeared after a small amount of ingested food Up to 2 weeks ago he slept well Since then he has been awakened often with pain and gas distress relieved by alkali or vomiting He has lost 10 pounds in the past 3 weeks tires very easily and has noticed his pale color increasing

Past history He has never had any infectious disease injury or previous operation

Family history His parents brothers and sisters are living and well

Physical examination The patient is a tall young man quite pale with rather worried expression weight 121 pounds blood pressure 130–80 temperature 99 4 degrees F pulse 94 respiration 20 red blood cells 3 400 000 white blood cells 11 000 polymorphonuclears 6 per cent lymphocytes 2 per cent eosinophiles 1 6 per cent hæmoglobin 56 per cent (Sahli) Wassermann negative The head neck and chest are well developed The abdomen is scaphoid in shape There is definite tenderness over the epigastrium maximum along the mesial border of the upper right rectus muscle An indefinite mass is palpable in the pyloric region The extremities are normal with satisfactory reflexes Two ounces of a test meal were recovered well digested blood was present free acid 36 total acid 56

X ray examination Fluoroscopy after a six hour meal showed the head of the bismuth column in the hepatic flexure with some of the bismuth remaining in what proved to be the third portion of the duodenum The full meal as is well illustrated on the films shows the stomach of the orthotonic type with a defect in the lesser curvature a niche over which no peristaltic waves passed although many waves passed over the greater curvature The entire duodenum appear to be filled and on deep palpation appears to be fixed

Provisional diagnosis was made of penetrating ulcer on the posterior gastric wall with adhesions to the pancreas and adhesions with constrictions about the duodenum

Operation was performed March 29 1922 St Vincent s Hospital New York City under gas ether anæsthesia

Operative findings The stomach was found considerably dilated the posterior wall being fixed to the pancreas by an irregular mass occupying a portion of the pars pylorica and pars media Transgastric exploration revealed this to be a large irregular ulcerative mass having a definite overhanging wiry edge quite suggestive of malignancy At the center of the crater there is evidence of penetration toward the pancreas Lymphatics along both curves were enlarged and soft The duodenum was found bound down by a firm mat of vascular adhesions The liver was moderately congested but showed no evidence of metastases The operative precedure consisted in a partial gastrectomy of a modified Billroth II type The duodenal stump was inverted and held by three layers of purse string sutures of chromic catgut Anastomosis was made close to the cut end of the stomach with fixation of transverse mesocolon well above the gastric suture line

PATHOLOGICAL REPORT BY FREDERIC SONDERN M D

Macroscopic examination The specimen consists of a portion of the stomach with a round tumor measuring about 85 millimeters the margin of which is superelevated while the center is concave The serous surface presents few small nodes is hard in consistency white in color and covered with coagulated fibrin

Microscopic examination The sections show a scanty stroma supporting very few blood vessels and wide agglomerations of polymorphous cells epithelial in character These cells are unequal in size without intercellular substance and present large hyperchromatic nuclei Many mitotic and pyknotic figures are seen In places there i a moderate infiltration of lymphoid elements Necrotic areas extravasated blood and much nuclear débris are also found

A diagnosis was made of carcinoma simplex of the stomach

Read before the Southern Surgical Society White Sulphur Springs December 9 3

The postoperative course was very smooth with no vomiting or wound infection Liquids were given by mouth 40 hours after operation in small amounts gradually increased Soft diet was given on the sixth day and a full meat free diet on the fourteenth day He was discharged from hospital April 2 1922

Follow up On May 1 1922 he reported a gain of 7 pounds in 3 weeks but complained of an occasional dizzy sensation There was no stomach distress the appetite was good hæmoglobin 78 per cent

June 13 1922 he reported a gain of 20 pounds since operation and no complaints He was eating a general diet He slept well and had gained in strength hæmoglobin 84 per cent (Sahli)

October 30 1922 he reported a gain of 24 pounds in weight He had had one or two attacks of stomach distress after meals of 1 to 5 minutes duration always relieved by gas eructation His weight was 145 ½ pounds At this time a small thrombotic external hæmorrhoid was incised and a clot evacuated otherwise he felt great

March 29 1923 he reported weight 149½ pounds and no complaints The bowels were regular He said I eat everything His occupation was the same as before operation and he had plenty of pep and rested well Examination of the abdomen failed to reveal any evidence of mass or tenderness

November 16 1923 he reported in person for X ray study and physical examination The weight was 154½ pounds no complaints— feel fine no evidence of recurrence was found

The X ray showed evidence of good function and motility the position was good

Gastric carcinoma is undoubtedly of exceptional occurrence before the age of 25 years whereas from the thirtieth year on its incidence rapidly increases No age is immune and a diagnosis relying to any degree on the tenet of cancer age may lead to a fatal issue (Golob)

STATISTICAL DATA

Cancer of the stomach during the first decade is extremely rare Only 6 cases below the age of 10 years were on record at the time of publication of Osler and McCrae's clinical study of the subject (1909) comprising an analysis of 7 000 cases Four cases concerned infants under 6 weeks 1 patient was a child of 18 months one observation on a boy of 8 years concerned a duodenal rather than a gastric carcinoma During the second decade gastric cancer is likewise very rare and only 13 of such cases could be compiled by Osler and McCrae The youngest patient was a girl of 13 years with carcinoma of the cardiac end of the stomach The other cases were 1 aged 14 years 1 aged 15 years 1 aged 16 years 4 aged 17 years 2 aged 19 years and 3 aged 20 years In the third decade cancer of the stomach is more common and probably occurs to the extent of 3 to 4 per cent Of the 6 cases collected by Osler and McCrae the youngest patient was 22 years of age like the young man under my own observation

Of 50 gastro intestinal cancers in youthful patients collected by Bernoulli in 1907 the stomach was the seat of the tumors in 13 cases 5 of which concerned the pylorus Three of these 13 cases are credited as originating from *ulcer of the stomach*

HISTOLOGY

With respect to the microscopical forms of gastric cancer a useful classification adopted by a number of observers is the following (1) adenocarcinoma (2) solid carcinoma and (3) mixed types The two first groups are subdivided into (a) carcinoma simplex in which the relative proportions of the cells and the stroma are so to speak normal neither element preponderating (b) medullary carcinoma (c) scirrhus and (d) carcinoma gelatinosum or colloid cancer

It is difficult to make any statement as to the relative frequency of these forms as specific designations of the variety found are missing in a number of reported cases Mixed or transitional types are very common and would probably be found with even greater frequency on examining the entire specimen instead of only a single portion of the tumor Among 13 cases of cancer of the stomach in patients under 20 years of age Bernoulli found 1 adenocarcinoma 1 medullary solid carcinoma 5 colloid cancers derived from adenocarcinoma or solid cancer 3 scirrhus cancers 1 diffuse carcinoma 1 mixed type 1 no statement Soft cancer is accordingly often seen as shown by 5 of 12 cases

SYMPTOMATOLOGY

After a detailed study of several reported cases the characteristic picture of juvenile gastric carcinoma is sudden onset violent rapid course with persistent febrile temperatures absence of cachexia and early appear



Fig C cinoma impl x of the st mach



F g Histological pict e f carcinoma shown in Figure

ance of metastases The rendering of an early diagnosis is even more difficult here than in gastric cancer at a later age Often the discovery of a palpable tumor in the gastric region first directs attention to the existence of a malignant neoplasm The gastric chemistry and motility demonstration of hæmorrhages in the gastric contents general manifestations as well as symptoms in the part of the digestive apparatus and radiographic findings show no difference in these cases as compared to the gastric cancer of older patients There is also no demonstrable difference as to the histological type of juvenile carcinoma or with respect to the seat of the growth in the stomach There are only three features by which these juvenile cancers differ from those seen in older patients absence of cachexia early onset of high temperatures and early formation of metastases The absence of cachexia is explained by the rapidity of the course so that the digestive disturbances lead surely to loss of weight but not to aged wasting of the body The high temperature is referable to disintegration and breaking down of carcinomatous tissue the fever beginning at a r latively early stage and persisting until death The early dissemination and rapid formation of nodules in a great variety of organs represent a remarkable feature of these cases The nodules are sometimes seen to become rapidly scattered over the entire abdominal cavity In a case reported by R Schmidt in 1916 of a medical student of 23 years lymphogenous miliary carcinosis of the lungs was found with metastases in the bronchial mediastinal and retroperitoneal lymph glands

In an article discussing the clinical differentiation between gastric sarcoma and carcinoma Schlesinger utilizes the violent course of juvenile gastric carcinoma for the differential diagnosis from gastric sarcoma the presence of lymphosarcoma being rendered probable by a slow evolution of the disease in youthful patients as opposed to the rapidly progressive and metastasis forming carcinoma His observations include 3 cases of cancer of the stomach in patients under 20 years of age In a girl of 14 years only 2 weeks intervened between the initial symptoms and the fatal outcome in a girl of 17 years the entire duration of the disease amounted to only 3 weeks in a boy of 15 years the disease likewise ran its course within a few weeks In one of the young girls the disease began with thrombosis of the brachial veins and a hard gland was palpable in the left supraclavicular fossa As a typical umbilical metastasis was discovered on examination carcinoma of the stomach was suspected in spite of the absence of a

palpable tumor or distinct gastric symptoms Within a few days the presence of gastric cancer became demonstrable It is noteworthy that Schlesinger knows of no cases in which operative interventions were not rendered hopeless from the start through early and profuse formation of metastases He emphasizes on the basis of extended hospital experience with ample opportunity for clinical and anatomical observation that gastric cancer in youthful patients between 10 and 30 years of age is usually characterized by the extraordinary rapidity of its course The behavior of the gastric chemistry and motility occult or manifest hæmorrhages blood findings urinalysis pain size of tumor and so forth do not permit a satisfactory differentiation between carcinoma and sarcoma of the stomach

The symptomatology of gastric cancer in the young as compared to that seen in older patients presents no essential differences according to all observers although genuine cachexia appears to be less common in these cases Often there is merely anæmia with an otherwise fairly good nutritional condition The progressive anæmia combined with constant pain gave me my clue in an otherwise obscure case The diagnosis is perhaps not always rendered because in a general way a malignant tumor is not so readily thought of in a youthful patient Timely recognition and removal of the cancer are especially important in view of the tendency to a remarkably rapid course a prolonged duration being exceptional Surgical interference according to the literature has usually proved inefficient coming too late for radical removal of the primary growth and prevention of metastases The future will have to show if the onset of malignant disease can be discovered by improved serological methods

DIAGNOSIS

It is of great practical importance not to slight or omit a careful general examination in a young patient suffering from chronic gastric disturbances under the erroneous impression that a malignant process is impossible at this early age In view of the fact that a pathognomonic symptom of gastric cancer other than fully developed tumor does not exist it is urgently indicated that all available diagnostic adjuvants be utilized Among the important diagnostic aids in these cases other than X ray study is the proper use of gastric catheterization for aside from the microscopical and chemical study thus available it will help to ascertain the exact localization of a tumor when the stomach is empty The omission of this method of examination may lead to serious error in diagnosis In one of Rueti meyer s cases a girl of 19 years who had been treated a long time with drugs for dilatation of the stomach it became possible after the removal of the enormous gastric contents from the fasting stomach to recognize a distinct hard nodular apparently freely movable tumor in the pyloric region which could not be palpated before the irrigation on account of the tension of the abdominal coverings The recognition of cancer is especially important in the so called prediagnostic phase and a searching inquiry must be instituted on the basis of the slightest suggestive evidence And it must be kept in mind that there is a natural absence of distinct manifestations in the case of growths affecting neither the cardiac nor the pyloric orifice of the stomach and therefore interfering at first in no way with the entrance of the food or its passage out of the organ

TREATMENT

Operative treatment of gastric cancer in the young as well as in older patients is indicated in all cases in which the removal of the tumor itself and its immediate metastases seems to be possible and also in those cases in which the neoplasm has led to stricture of the cardiac or pyloric orifice of the stomach An exploratory operation is called for in most cases Contra indications against surgical interference in any form may be due to the general condition of the patient or to the behavior of the malignant tumor itself

Non operative methods under consideration are irradiation with X ray or radium But so far results are not encouraging and the procedure is applicable only as a last resort Experience has shown that the results of raying are not improved by so called externalization of the tumors followed by direct radiation

Serum therapy is claimed to have occasionally exerted a beneficial action on the course of gastric carcinoma but the results are neither uniform nor reliable The purely medical treatment of these cases must of necessity be limited to the treatment of symptoms especially pain and starvation

Surgery of carcinoma of the stomach Total or partial gastrectomy is always the procedure for consideration in these cases Total gastrectomy will seldom be called for because of the low per cent of cases warranting it Partial gastrectomy when possible is the procedure of choice In the Billroth I or II the Polya Balfour or the Finsterer operations the essential requisites for adequate removal of the tumor and gland bearing tissues will be found Likewise these operations provide a satisfactory reconstruction of the gastrointestinal tract The operation of gastro enterostomy is indicated when radical surgery is no longer possible or in existing or incipient pyloric stenosis in inoperable cases Anterior gastro-enterostomy combined with jejuno jejunostomy should be considered especially if the growth shows a tendency to spread on the posterior wall An exploratory laparotomy alone will be restricted to those inoperable conditions where gastro enterostomy is not required The performance of gastrostomy is called for in inoperable cancers situated at the cardiac orifice while a jejunostomy may be done in cases of pyloric carcinoma with stricture where gastro enterostomy is not practicable for technical reasons

CONCLUSIONS

1 Gastric carcinoma in young people should be considered more often

2 The sudden onset rapid course with persistent febrile temperature and progressive anæmia without cachexia in a young person complaining of gastric distress and pain should raise the suspicion of carcinoma

3 Surgical treatment should be not only early but as radical as possible

CASE REPORTS

Case R po t d by C T C lli gw rth This obs rv t o c cerns th young t k own case of g stric ci om n a ewborn i f t wh from th te th day of lif n uffe d f m omiti g and bst pation Rap dly progressi e cachexia s p vened a d l d to d th in the fifth week The autopsy showed an enormously dilated stomach which ccupied almost the entire abdominal ca ty The gastric wall wa co iderably th cke ed especially at the pyloru hich pres ted pe r sh ped protrud g ul c rated tumor occlud g the pylorus Microscopical e am nat on showed a cylinde cell epitheli ma

Case 2 Reported by \ Scheff r Carc noma of the g s tric fundus in a boy f 4 y rs g v the clinical p ctur f an extremely painf l l rg m nt of the spleen with irr gu la remittent fe ers I the l st few we ks of life coffee g ound like ma es we e vomited Th patient died 3 weeks after the beginning of the d e s Th ut p y how d the g stric fundus t be con tricted by the tumo s a larg ulcer occupied alm st the e t e fundus as far as the card The tumo had pe etrat d thr ugh the gastric wall volving the left kid y nd the pleen which w s f r the most part de troy d The pa c eas was ent rely encased and infiltrated by the tum r The gr ter curva ture w s occupied by t mo nodules Metastas s were f u d the mesenteric and lumbar lymph glands M r c p cal e amination showed a med llary carcin ma

Th case of primary gastric ca r wa p act lly c ceal d d ring the p t ent s lifetim by th sec ndary c n cer of the spleen In the course of the d ease the spleen became ol ed and for the mo t p t dest oyed In these ci cum tances the symptoms on the pa t of the stomach may bec m so effectually obscured that no reliable d ag nosis of gastri carcin ma can be rendered during life th ymptom compl x on the pa t of the spl en d minating the e t e clinical p ctu e

Case 3 Reported by N Moore The p ti nt was a gi l f 13 ye s wh c me und treatment with symptoms of treme a æmia h t f l e and œd ma The spl en w s enla ged but st mach sympt ms wer ab ent until two days before d th wh n the patient beg n to c mpla n of om ting and bdomi al pai s The autopsy howed a cancer 8 centimeter i di mete tuated at th cardi c d of the tomach and adhe e t to the li er P rforation int th abd minal ca ity had occurred givi g r e to e cent p ritonit Th e w r no metastases Microscop cal xami at on sh wed a soft m dull ry canc The m c o scop c char cters of th new g owth wer those of c ci noma w th somewhat wide trabecula a d e te siv mucoid degener tion f th ells with hæmorrhages nt se e al parts of the g wth There were o other infiltrati s

Case 4 R ported by H Ko ster Thi was a case of gastric ca cin ma in boy of 17 y ar The clin al pict e was haracteri d by em ciati hæm temess and a palpabl tum in the epigastrium Deta led e amu at n showed a dilated stomach d the ab enc of fr e hydr chlor c cid The autopsy re eal d n ulc rated cirrho can of th ext em ly narrowed pyl ru N m u nodul were d tributed ov the p ritoneum m b t no ther met sta es

Case 5 Report d by A hby and Wr ght Thi bserv tion co erned a child of 8 years who at the time f ad missi n to the ho p t l suffe ed f m m t orism without ther sympt ms Some months later t mor co ld be palpated to th right of the umbilicus The p t nt c m pl i d f s ere p in a d di d oon afterw d Th utopsy sh wed s lid dhe ns b tween the stomach nd d od um a d tran erse ol n The stomach wa d lated d hypert ophied and th pylorus barely admitt d a fing At th pylorus tow d the tomach we e two small tumors the ize of a pea downward at the d od n l n tr nc was n ulce with irregular margin Mic o copic l ami tion h wed c c n ma

Case 6 Reported by R Dur ea Th p t ent a you g w man in h tw nty second year had alw ys been in good

l ealth u t l the age of 2 y ars d ga e an e celle t f mily h story Il illness came on grad lly with eructa ti d a e a V miti g occurred first t i ter ls then bec m da ly and finally recu d fter e ery meal *t was pai ful a d so f quent that p act cally all the* pat t s food as ejected I ddit a colo less glairy mucu was xpelled b t no bile blood ta d m t r l t l ery late in th d Th t eatment was gen ral and ymptom t c b t had n effect b y d t mpo y el ef f the pa Th ll ess l t d b ely eight months d p to bo t th fifth month g r e ly t g er l d turb es h m ciat o pallor and l ss of *st engtb Tl ere was n l t f t mperat r* \b d mi l palp t o p to this time yielded nly consider able d latat n f th t ma h d m tr bl by pe c ss By e cl o ap ob ble diagn s of t mor of the stomach w r hed n th b ce of po t local ymptom I rom the fifth month on a pos t e diagn is of gastric t m d ob tru t of th pyl ru w r d rred The growth t only i creased in s z but bec me lc rat d t its internal po ti *od g the essel f r ff gr und* mit t th t m made its appea ance Fight m ths afte the onset of th di e the p t t di d u d r symp t ms f p gr ss e cachexia and a æmi Th t psy showed a g eatly dil ted *stoma h co ta n g a tumo th* size of ry larg range with ut adhes o t the e gh bori g gans The t mo w s bsolut ly l mited t th pyloru d m tasta es could be di o d in the othe bd minal or tho acic i c r Hi t l gical e mi t on of the tumo sh wed a cyl ndrical cell ep th li ma of th st mach

Cas 7 R ported by E Hirtz a d E Les The p t t as a yo g w m n of 19 ye rs wh h d acq ed syphilis in h r thirteenth ye r The gastric affli t n had existed four mo ths with severe p ga tric pai s after meal d occa nal omit g She lost in w ght d sympt ms of ste osis f the c d e d of the t mach gradu lly upervened Th d gnos w luet c stri ture D th was h ste d by phthis s with ca it es both p l mon ry p ces At th topsy th t mach w f und t be adhe t t ts nti e sur ding The gastric wall w s whitish a d thi k ed s a wh l be g 5 ntimeters thick t the greate curv ture Th pylorus was sh rply bo ded off f m the d od m The was ch o c peri tonit with sm ll odules Th m sent ric gland we e larged with partly s ated ce t rs M osc p lly th d gnos f syphil s w r d ed but c ful mic scop c l e ami ti sho ed diffusely nfiltrati g c r c om t nding the enti tom h d n ed f om cyl drical ll eance There was carcino f th peri tone m Mic os p cally t mor cells w re als f und the om nt m the mes t ric gla d th panc a d the spl Th d agno f e te ep th f ma of th ent re tom h in th y uthf l patie t was e d ed ly th ba of the muc c p l find ngs The co d ti n duri g hif h d mulat d tinct re of th œ oph gus d the m c oscop cal app ance d d t p ent th o d ary feat r f c cer of th stom h

Case 8 R ported by De l Camp Two cases f g tric c in yo thf l indi duals po ted O bs rva t co rned boy of 6 y e rs wh had suff ed f m g stric di turb es 4 w k w th rap d *m tio and* de th Th autop y ho d a t m of th pyl ric gi n U d r th muc sc p the thick nn ct tissue w th f i ly me n cl w s f u d t co t in m e o l ss te l y rs f ep theli l cells The m scul r was in ded in p rt by conn ted p lif rat s wh l the m scl fibres w e in p rt int rspersed by ind d al epith hal c ll Som loc lit s pr ent d ft ng d d ge e t e ch *ges*

The other cas concerned a boy of 17 years At th u t psy th stomach wa f d to be adh t to th plee h r d pan r s The ga tric m osa was ul rated t a exte t of bout t hal es co e p d g t the les curv t e the a terio a d p teri r rf c with a sh rp tra sit o t h lthy t ssu Th r w mall meta t t c nod les on both d aphragmat c s f ces and th h p t rf ce a d la ged glands at the gr t curvat a d in the mesentery No bo e m t tas w re fo nd M o- op c l e m n ti showed a l ge al eol r partly m d l lary ca c d i ed fr m the ga tric m c with c po ding meta tas pr ded th s ty t oma (Thi ase wa pe li ly compl cated by a t be culo s i f ct 7 y rs p e iously and 8 days bef r death th d gnos w s tubercul cari s f the t bral l mn d ys b f re d th h d strand first becam p lp bl in the l ft hypoch drium)

Case 9 R po t d by L R t mey r This ob ervati n e ned a boy 15/ ye s of ge h compla ed f gas tric disturba es pa aft meals late omiting bo t *h lf a h ft t g hæmatem is* Abo t yea late a tum r could be palp ted b l w th umbil cus The d gnos was pyl ric carc noma

Oper ti e treatm t w d e in two ta es pr limi ary *gast o-ente stomy followed 4 w eks by pyl r t my* d rem l f gla d bearing t ss es Two m th lat a r t rm f gastri dist rbance w s tr lled fai ly ll by medical means At th e d f 5 mo th recu e c was *dem tr ted to the right f the cicatrix* A g ad l in re se i sympt m a d size of curr nce ma took pla The sudden rap d gro th f a ecurre c led t death Th d rat f th dis se w 3 years \ t psy sh wed that the recu occupied th larger po t f the m g tomach Th w r nume metastases n the l

Case 10 (R etim y r) The p t nt gi l of 19 y rs mpl ed f 5 mo th of g tric d tu b c in th f rm of spasms ind pe dent of m ls a d gr dually p ogress miting Sh had lost 2 po ds i w ght d ri g the last 6 m ths Sh w treated f r a lo g tim medically f g st ta E amu t ft r remo l f the rm content f m the f st g t ma h sh w d d st ct hard odul ppa tly f ly m bl tum r bel w d t th right of the mb lic which eemed t belo g t th pyl ric regi Th test m l yi lded f ee hyd ochlori acid l ct c acid w prese t in la g mount the pepsin gen was p e ed Operat sh d a t mo f h d mensio to re d ts t rpati mp a t cabl Th g wth occup ed the pyl ric regi n l e curvat and post rio ga tric wall w th num r us dhes o and m lt pl gl dul m tastases well as ca cin mat us infiltra t o f th pent um Gast o-e te st my w perf rmed d led t a s tu f ctory funct l res lt D th o d bout m ths l ter aft the fo mat f f ecal fistul th o gh perf rat f th t mo *mass int th bo l*

Ca e (R et meye) The p t t w y ng w man f 3 ye rs wh h d c mpla ed f ga tri dist ba es f 3 m nths the st mach h vi g b n perf ctly normal p to that tim A pe es u e s sat vas f lt r th t m h afte eati g d the p tie t ften vp rn ced pasti s sat o in th rd d œsophagu indepe d tly f th gesti f food Th was m h mit g b t *hæmatemes* A od l tum co ld be p lp ted th pyl ric gi n Chemical find gs sh wed the p ce f hydr chl ri d and a bse c of lact d Op rati aled larg operabl ca cinom f the pyloru d th lesse curvat e Death bout 3 m th l t r f ll ed gastro-e t ost my

Case 2 Repo ted by A Schmi k A boy of 6 y ears uffered f om gastric can The diagnosis could be re dered on the b s of a palp ble t m Vomiting was

p esent and f tty acids and blood were found in the g tric contents The autopsy showed a larg ulc r at the less r curvat re close to the pylorus The floor of th s funnel shaped ulcer was white and cicatricial The tumo m es enclosed and strictu ed the pyl rus Ther was thrombo f the portal ein The region l lymph gl d w re exam ined under the microscope The condition was medullary ca cinoma

CASE 13 Reported by P Anning This was a a of carc oma of the stomach in a boy of 19 y rs Se en y ars ag the patie t suffered a tra matism n th ga tric eg n followed for lo g time by pain in the ep gast m and gn of chr c g stritis In the past 8 months the ditio h d become more c te with gastric pains and muti g Lapar t my showed a gastric tum r the size of hild s fist adhe ent to the left lob f the l er There e e numero s enlarged glands Posteri r gastro-ente ost my was do e Death from a them foll wed 3 m nths late Autop y findings The tumor occupied the entire les e curvatu e as well as the upper portion of th greater curva ture nearly to the gastro enterostomy opening Carcin is of th perito eum had taken place with m ta tases in the liver the head of the pancreas and the lymph gl nds M oscopical examination sh wed a sci ho s cancer

CASE 14 Reported by H ch The p t e t was a boy f 15 years who worked as a addle s apprent ce F 7 w ks he had vomited and complain d of pain bel w th left costal arch One profuse gastri hæm rrhage occu red fte his admis ion to the hospital A th ck nodular tum r uld be p lpated Free hyd ochloric acid was ab ent but lactic acid was present The diagnosis was mal g t tumo of the st mach T eatm nt consist d i g st ente ostomy The v miti g p omptly recur d nd the pat ent d ed under ymptom of p ogressi cache ia 5 weeks aft r the set of th disea The aut psy howed the t mach to b pa tly adhe ent to th diaphragm nd th spleen Th pylorus was te osed At the g e t r curvature betw n the ce t r and th pyl ru was an ulcerated s rf c the size of a small palm with irregular borde d p er on and a floor cove ed w th a blackish l yer Underneath th ulce a t mor mas the size f a child s head co ld b pal pated reaching a far as the vertebral col mn The tumor was adherent to the head of th pa creas and the left lobe of the l e Th e we e metastas s in th l g l er peri eum bladd r d phragm nd ileum Microscop cal examinat on howed a medullary ca cinoma

CASE 15 Reported by Ghon A pec men of cance of the st mach d ri ed from a boy of 3 years was pr ted before th Vienn Soc ety f r I tern l Medicine and Ped trics N embe 28 907 This g st c car in m had de loped n the ba s of n ulcer f the lesser c rvatu e whi h in its turn was the re lt of c t riz t n of the st ma h w ll th ough swallowing of c ust c lye

CASE 16 Reported by F Ka l Th p ti t was a boy of 9 ye rs wh we ghed nly 28 po nd and was p ct c lly skin nd bo es The illnes was of ab ut 2 months t d ng nd the ch f ympt m w mit g f ll f od with hæmat me A ha d sl ghtly displ ceabl tumo tender n pressur co ld be f lt the pyl ric r g n t th right of the umbilicus Oper t sh w d a f ly mo bl rr g lar tumor the of hild s fist nd the d gnos s of ca cin ma c ld be e de ed on mic osc p c inspe t The mic pe eveal d a sm ll c ll lar filtr t g n e which h d invaded all th lay of th gast c w ll as fa as th e sa Th pe t on w s m kably w ll t lerated nd th ch ld mad a good recovery g g 8 pou ds in w ght in 3 e ks when he wa d harged f m the h p t l O inqu ry 3 m nth l t r th boy was found t be good h lth we ghi g 59 po d Ka l ex p esses doubt as t the futu e c rs w of the ge r l unfavo able experience in juvenile carc oma in g eral d f the t m ch in part cular

CASE 17 I po t d by R Schm dt This w s a case of gast ic canc in a n edical student of 23 yea s at whose aut psy a muc us ulce of the stomach was f und which t p t pre nted typ c l trands of cance cells pene t t g into th subm cosa and the mu cul layer Other findings c n i ted of a miliary carc sis of the lungs as well a metastases in the br chial mediastinal nd retrope i t n al lymph gl n ds

CASE 18 I ported by W B Co ens The patie t was a G rma w r p sone ged 18 yea s and 10 months who r po ted himself s ck with dyspep ia and vom ting Five d ys l te he as found to be in condition of profound collapse with frequent v mit g and ge e al abdominal pain A mo th ou ded tumo occup ed the space be tween costal m rg n a d umbilicus When the abdomen a pen d 3 d ys lat r the liver was seen to be generally enlarged a d st bbed ll o e ith n dules a small g owth a d c red n ar th pyloric e d of the stomach The e wa f rther pe ti e interf ence Death occur ed ab t 4 w ks l t r The gastric wall wa found to be the se t f a n gr wth having the histological truct e of car in ma of the sci hou type wh ch had unde go e alm t complet necrosis fibrosis and calcareous i filtr ti n Th l er as f eely i filtrated by deposits of new gr th th m cro copi l structure f which was that of a carcinoma The stom ch w s und ubtedly the primary seat of the tum r

CASE 19 Reported by R G Huss y The patie t a wh t wom n aged 26 years was adm tted to the h pital c mpla ing of stomach t ouble nausea nd vomiting Th n t f th llness wa bout 4 months p e iou to adm s- sion with pr g essive loss of app tite weakne a d emac ation F months she had noticed a hard l mp in the pper abd m Fxami tio showed a sau ge shaped m smooth in outline sit ated midw y between the en sif rm a d umbil cu f eely movable not tend r descend ing on in p r t on The cl nical mpression was pyloric bst cti n probably ca cin ma f the stomach and sta vat At lapa tomy 6 days aft admis on the stom ach was found t be involved in an e ten ive malignant process Anterio g tr jejunostomy was followed by d ath i days fter p at n The anatomical d agnosis was coll d car noma of the stomach pylo ic st os s a d meta tases in the regio l lymph gla ds Micro- sc p c lly the tumor cells ari d in shape and size but for the mo t p t v e cub cal or cylindr cal th y had large ves ul r n clei and the r cytopl sm wa f equ ntly v cuo lated

CASE 20 Reported by D A La d The pat ent a boy 15 years of ag thout suggesti e hered tary or p sonal m d cal h t ry omplained of p in of f tnight s dura t on with occasion l v mit g There w s a p lpable epi ga tric tumor The l r was enl g d and there w s a l uc cytos s B th test m al nd v mitus showed abs nc of f hyd ochloric ac d Th e wa no X ay e idence of v l e Lo s of ght w sp ogre e nd rap d Laparot omy was p f rmed a d re led an i oper bl growth of th le sc curvat e f the t mach with se o da y nodules fr m the mesent ry sho ed col mna -celled carcinoma De th foll wed soon aft r the per t on

CASE 2 Repo ted by A Gald de Th p t nt was a boy of 15 years whose ll e b g nabo t 6 w eks previous ly with ep g stric pa ns R di raphy e aled the pres nce f a t m in th ep gastrium Surgi l interventi n showed tumor of the great r curvature dher nt to th panc e s and oment m A small gr wth w s removed f biopsy a d the abd men was closed

Tw l e days aft the operation th pat nt uccumbed t cach xia the d ease ha ing run its ent e c s n z n o ths a d 3 d ys

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GENTIAN VIOLET SOLUTION INTRAVENOUSLY IN THE TREATMENT OF PHLEBITIS[1]

By WILLIAM F SHALLENBERGER A M M D F A C S ATLANTA GEORGIA
Assoc Prof of Gynecology Emory University School of Med

THIS is a preliminary report on the intravenous injection of gentian violet[2] solution in the treatment of phlebitis Although we have had only 5 cases so far the results have been so striking as to justify the report

Churchman in 1912 demonstrated the selective bacterial action of gentian violet showing that it had a selective action on gram positive organisms Thus the growth of the staphylococcus is inhibited by dilutions of 1 1 000 000 The bacillus subtilis is also inhibited while the colon bacillus is affected almost not at all It has further been demonstrated that in dilutions of 1 50 000 gentian violet apparently has no effect upon white blood cells exposed to the solution for hours Growing human cells grown *in vitro* were not injured by dilutions of 1 20 000

In a paper presented at the meeting of the Southern Surgical Association last December Hugh Young reported some remarkable results obtained by the intravenous injection of mercurochrome and gentian violet solutions in various infections of the blood stream and also in localized infections Gentian violet solution is indicated in infections with gram positive organisms

The most common infective organisms in phlebitis and thrombophlebitis are the pyogenic cocci staphylococcus and streptococcus It therefore seemed rational to try gentian violet solution intravenously in this condition The results that have been obtained in the few cases in which we have used it promise well Brief reports of these cases are given In two of the cases I gave the treatment myself in two others Dr Stringer at the Wesley Memorial Hospital gave the treatment under my direction and in the fifth case Dr C E Waits tried it Dr Stringer and Dr Waits have kindly furnished me reports of their cases

CASE 1 Mrs S para III had an easy spontaneous delivery December 6 1923 with no laceration and no elevation of temperature at any time while in the hospital She went home in an ambulance on the seventh day postpartum On the tenth day she had some pain in the left groin and on the twelfth day her temperature went to 10 degrees The pain became severe in the groin thigh and calf of the leg and necessitated the giving of ½ grain of codeine from two to four times daily for relief The temperature ranged from 100 to 103 degrees for 4 days when gentian violet solution was given In the morning 30 cubic centimeters of a 1 per cent solution were injected intravenously No reaction followed By night the pain began to subside and by noon of the following day the pain had entirely disappeared and the temperature came to normal and remained normal A second treatment was given 2 days later as a safeguard although the patient was free from all symptoms In 5 more days she was out of bed and walking about No blood culture was made

CASE 2 (Dr Stringer) Mrs R para VI entered the hospital for incision and drainage of an abscess of the right breast 6 weeks after delivery Temperature on admission was 99 4 degrees Four days after operation she complained of pain in the left leg Next day the leg was swollen and tender and her temperature went to 101 degrees The leg was elevated and a pressure bandage applied This gave considerable relief Two days later the temperature went to 100 2 degrees and on this day 30 cubic centimeters of 1 per cent gentian violet solution were given intravenously On the following day the patient felt much better and there was no pain or tenderness the highest temperature was 100 degrees Two days afterward the temperature came to normal The blood culture was negative

Observations by Dr Stringer

1 There was a definite phlebitis in the long saphenous vein of the left leg

2 There was no reaction to gentian violet solution intravenously and no thrombosis of the vein at the site of injection

3 Prompt relief of pain and tenderness followed

4 The subsequent temperature was subject to slight variations but never above 99 4 degrees

5 The picture was complicated by a concurrent abscess of the breast which showed no definite reaction to gentian violet

CASE 3 (Dr Stringer) Mrs C age 51 was operated upon December 18 1923 A complete hysterectomy was performed under ether anæsthesia On December 30 she complained of legs and

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back being painful and tender to pressure The temperature went up to 102 degrees Her temperature had varied from 99 to 101 degrees prior to this

On January 3 the right leg was swollen and tender and the site of a definite phlebitis the temperature up to 102 2 degrees January 5 a pus pocket in the incision was opened January 6 to 14 the temperature varied from 99 to 100 degrees The right saphenous vein became completely thrombosed and a red line marked its course The leg was swollen and very tender to pressure January 14 tenderness and pain developed in the left leg Gentian violet 30 cubic centimeters of 1 per cent solution was given at 3 p m The temperature rose to 100 3 degrees at 8 p m January 15 she felt better and was able to move the legs There was less tenderness and the right leg was less swollen There was no trouble in the left leg January 16 the temperature was normal all day She felt better than at any time since operation January 17 a second dose of gentian violet was given January 18 to 28 the temperature was normal and legs free from pain

Observations by Dr Stringer

1 Phlebitis developed in the right leg 14 days after operation Later tenderness developed in the left leg There was complete thrombosis of the right long saphenous vein

2 Gentian violet was given intravenously on the twelfth and fifteenth days after the onset of phlebitis and after thrombosis had occurred

3 Rapid loss of pain and tenderness and swelling in both legs followed the intravenous injection of gentian violet solution

4 The moderate reaction to treatment was probably due to the highly nervous type of patient.

CASE 4 (Dr Watts) Miss A H age 30 entered the hospital on January 9 with a history pointing definitely to a subsiding attack of acute appendicitis At operation on January 10 this diagnosis was confirmed the appendix being acutely inflamed throughout its distal one half and containing two or three fæcal concretions Suppuration had not occurred Appendectomy was done and the peritoneal cavity closed without drainage A rubber wick drain was placed in the fat at the lower end of the wound because of possible contamination The postoperative course was smooth and uneventful up to the twelfth day at which time the patient was removed home On the afternoon of the twelfth day she complained of pain and swelling in the left leg and thigh and her temperature was 101 degrees There was tenderness throughout the course of the vein and moderate swelling The patient was again put at complete rest with the leg bandaged and elevated Gentian violet 20 cubic centimeters of 0 5 per cent solution was given intravenously One hour later the patient complained of chilly sensations but no definite chill The temperature was 102 degrees Twenty four hours later the temperature was normal and the swelling in the leg had subsided markedly There was also much less tenderness along the course of the vein All swelling and tenderness subsided completely within 7 days after the injection and the patient has had no further trouble The promptness with which the phlebitis subsided we believe was due to the use of the gentian violet solution

CASE 5 Mrs H para I had a postoperative febrile course of 10 days after cæsarean section A blood culture was negative The patient went home in 3 weeks Two weeks later after being up and about she developed pain in the left groin and later in the calf of the left leg with elevation of temperature and a well defined phlebitis Gentian violet 30 cubic centimeters of 0 5 per cent solution was given intravenously on the second day and 45 cubic centimeters of 0 5 per cent solution were given on the fourth day There was amelioration of symptoms after the first dose but the fever continued After second injection all pain disappeared and the temperature came to normal and remained so

In giving the gentian violet and we have given it many times for various other infections besides phlebitis we at first used a 1 per cent solution We found that this often caused a thrombosis of the vein at and above the site of injection Recently we have used 0 5 per cent solution and have given larger amounts The solution is prepared by dissolving gentian violet in sterile freshly distilled water and it is probably best to filter it Sterilization of the solution is not necessary The maximum dose is 5 milligrams per kilo of body weight We have not noted any bad symptoms or reactions Some of the patients have manifested nervousness and have complained of weakness Sweating was frequently observed A bluish tinge to the skin simulating cyanosis usually appears but passes off in a short time The treatment can be repeated several times at 2 or 3 day intervals

No complication of surgery is more distressing than phlebitis It usually makes its appearance at about the time when the patients are well along in their convalescence It retards the convalescence by many days and weeks often causes much pain and discomfort and may lead to much more serious consequences and even death Very frequently more or less permanent disability follows

Definite conclusions cannot be drawn from 5 cases but if our results can be borne out by subsequent trial it would seem that in gentian violet we have a remedy that promises to be of great assistance in combatting and aborting phlebitis

ABSCESS AND GANGRENE OF THE THYROID GLAND[1]

By MOSES BEHREND M D F A C S Philadelphia

THE apparent rarity of cases of abscess and gangrene of the thyroid gland especially of gangrene prompts the writer to report 3 such cases of abscess and 1 of gangrene There is little literature on the subject some textbooks giving it just a passing mention No doubt all cases that occur are not reported on account of the preponderance of other thyroid affections which overshadow the seeming unimportance of the acute inflammatory affections of this gland While abscess of the thyroid gland may be considered a rare condition gangrene of the gland must be considered almost an anomalous disease In the experience of the surgeons connected with the Jewish Hospital in the past 35 years 2 cases of abscess (Dr Teller s and the writer s) and of gangrene were observed One case of abscess of the thyroid gland was operated upon in the Mt Sinai Hospital

More attention should be paid to these acute affections and more cases should be reported so that the symptoms and signs may be recognized more readily On account of the grave complications that may arise a knowledge of the anatomical arrangement of the cervical fascia is essential

The thyroid gland receives an investment of the middle lamella of the deep cervical fascia from either side of the neck the two layers meet and are continued down the neck through the thorax until they become continuous with the fibrous layer of the pericardium Because of this arrangement of the fascia it must be evident that temporizing is dangerous in these acute affections the earlier the diagnosis is made the better the quicker the gland is incised and drained the more surely will complications be prevented The great dangers are perforation of the trachea œsophagus the great vessels and the mediastinum

DIAGNOSIS

The main factors in making a diagnosis are the signs of inflammation redness swelling and œdema of the overlying tissues in the median line in the region of the thyroid gland These are the primary manifestations which if allowed to continue will soon be followed by dysphagia dyspnœa congestion of the face epistaxis nausea vomiting and delirium (DaCosta) Pain varies according to the degree of inflammation Fever chills headache and temporary hoarseness may occur

The prognosis must always be guarded If the patient is seen early and proper treatment is instituted there is practically no danger from abscess of the thyroid gland Late cases are always serious on account of the burrowing of the pus especially when it breaks through the cervical fascia and enters the mediastinum Cases of gangrene are almost always fatal In favorable cases inflammations of the gland do not go to suppuration

Infections of the thyroid gland are rarely primary Inflammatory conditions may follow any infectious disease such as puerperal fever influenza erysipelas orchitis and acute inflammatory rheumatism (Ochsner)

The writer s cases follow

Case 1 Abscess of the thyroid gland M L age 54 female was admitted to the Jewish Hospital May 29 1920 She was discharged as cured June 6 Six days before admission she complained of headache The following day there was pain over the thyroid gland Inflammation and swelling followed The pain became unbearable There was present the typical swelling of the neck in the median line The overlying skin was red swollen and œdematous Under gas and oxygen anæsthesia the gland was incised and drained

Case 2 Abscess of the thyroid gland N P age 36 male was admitted to the Mt Sinai Hospital May 31 1923 This patient walked to the receiving ward complaining of dysphagia dyspnœa and swelling in the region of the thyroid gland The diagnosis was readily made the gland was at once incised and drained His recovery was immediate and the patient left the hospital 3 days after admission

Case 3 Gangrene of the thyroid gland L S age 40 was seen in consultation 3 days after his sickness began We found a robust man with a rather large swelling on the ventral aspect of his neck While the neck was moderately swollen especially over the thyroid gland the patient did not seem to be in a precarious condition The following

[1] Read before the Harvey Society of the Jewish Hospital May 9 1923

day the picture changed The entire circumference of the neck was enlarged the œdema extending to the chin His face was suffused congested and bluish in color He was dyspnœic and in great discomfort however he did not complain A few hours before operation he developed a symptom which we considered of great import that of cough and expectoration of a foul smelling sputum A perforation of the trachea had occurred

The operation was performed under local anæsthesia novocain one half of one per cent being used Four incisions were made across the neck extending from the hyoid bone to the suprasternal notch At the level of the incision made in the thyroid gland a dark black background was noticed The finger felt the trachea which was bare the pretracheal fascia apparently having been destroyed After operation the patient collapsed the pulse became hardly perceptible and he was cold and clammy Next morning the condition was somewhat improved It was thought that he had a chance to recover but *toward evening he became delirious* The following day found him in better condition but he was still coughing and expectorating sputum *of the character described above The wounds were* unhealthy and foul smelling The night of the second day following operation he became violently *delirious and was restrained* with great difficulty He died early in the morning of the third day following operation

G Beilby reported three cases of thyroiditis secondary to other infections These developed *pus Two cases occurred in normal* glands the other in a cystic adenoma of the thyroid He claims that the rare occurrence is difficult to explain on account of the close proximity of the thyroid gland to the pharynx *tonsils and lymphatic structures which might* be expected to predispose to infections within the thyroid by direct lymphatic extension

Case 4 (Beilby) In a man age 64 laryngitis and tracheitis preceded the thyroid condition by 3 weeks Then he developed a chill high temperature and pain in the throat A diagnosis of acute thyroiditis was made Extreme dyspnœa and dysphagia were present Under local anæsthesia *the gland was* incised and 50 cubic centimeters of thick yellow pus exuded Recovery was rapid

Case 5 (Beilby) A man age 48 had had sore throat 5 weeks previously He had a chill and some febrile symptoms A laryngologist made a diagnosis of acute thyroiditis The patient suffered from an extreme degree of pressure upon both trachea and œsophagus The gland was opened under local anæsthesia The patient left the hospital a week later

Case 6 (Beilby) *Enlargement of the thyroid* gland in this patient occurred 4 years after childbirth Three months before admission she had a severe attack of *influenza The neck became swollen* and painful she had a rise of temperature every day and developed a chill followed by dyspnœa and dysphagia *She was septic and in a serious condition* The diagnosis was infected adenoma of the thyroid gland The gland was opened under local anæsthesia and a large amount *of purulent fluid and* blood were evacuated Culture showed streptococcus hemolyticus

Beilby believes the pathognomonic sign is the stony hardness of the gland elicited on palpation no other condition except carcinoma gives a similar feeling

Case (Cipialini) Cipialini reports a case of abscess of the thyroid gland secondary to mastoid abscess

Case 8 (E A Treacy) Thyroiditis with abscess formation followed the administration of thyroid extract A widow aged 51 with moderate sized goiter was given one half gram desiccated thyroid after each meal After a week the right lobe became painful and the treatment was stopped After 2 weeks the painful lobe became reddened and opened spontaneously with bread and water poultice The lobe sloughed and the dead thyroid tissue was removed Healing occurred in 4 months

These are the only cases that could be found in the literature of abscess of the thyroid gland Not a case of gangrene was reported Ochsner states that about 7 cases have been reported but he gives no reference to them

CONCLUSIONS

1 Early diagnosis is important

2 The characteristic signs of inflammation with swelling in the mid line of the neck in the region of the thyroid gland should help to make the diagnosis

3 *Early incision under local anæsthesia* is important on account of the proximity of the cervical fascia and its relation to the mediastinum

4 Early incision prevents the serious complications *of perforation of the trachea œsophagus* and mediastinum

I would like to acknowledge my indebtedness to Dr M Whitehouse for his interest in the literature

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CHOLECYSTOGASTROSTOMY AND CHOLECYSTODUODENOSTOMY

By T G DuBOSE M D F A C S Selma Alabama
Ch f S rgeo \ gh M m al H p tal Gro p

THE end result in gall bladder surgery is unsatisfactory Repeated operations for recurrence is a reflection on surgical efficiency The dispute as to operation of choice is unsettled The percentage of cures is too lo"

A report of the experience with cholecyst enterostomy covering a period of 11 years and including 20 cases is probably worth while in the present unsettled treatment of gall bladder disease It is significant of neither method being ideal that the adherents of cho lecystectomy and cholecystostomy are still disputing the relative value of each and sur geons of wide experience are partisan some to the one and some to the other method

The gall bladder is a functioning not a vestigial organ It is admitted generally that it concentrates bile secretes mucu and is a reservoir for storage of bile Additional evi dence of function is that its removal is fol lowed by compensatory hypertrophy of com mon and hepatic ducts It should be con served when possible Because no serious digestive disturbance has followed its removal is of itself no excuse for its indiscriminate ablation Because its functions are not com pletely understood is no argument that its office is unimportant in the human economy The gall bladder figures less and less as the cause of gall stones jaundice and biliary in fection (18) as more is known of liver cell action normal and pathological In the etiology of cholelithiasis endocrine dysfunc tion (20) and consequent general systemic metabolic errors appear as causes even more remote than disturbances of the liver cell it self The pollution of the blood and the low ered functional capacity of the hepatic cell are the precursors of gall bladder disease hence this biliary diverticulum is rather a par ticipant in the pathological process than its prime factor It is temptingly surgical be cause easily operated upon The fact is that gall bladder infection is a secondary never a primary infection and when its severity puts it in the ascendancy urgent surgery is re quired this when done is only a part of the necessary treatment Subsequently a search for and removal of the primary infection must be accomplished before the melancholy and all too frequent recurrence following either radical or palliative gall bladder sur gery will be lessened or prevented It has been tersely put that operations on the gall bladder are operations on the end products of the factors producing gall bladder disease

Cholecystoduodenostomy and cholecysto gastrostomy have been operations of neces sity rather than of choice It remains to be seen after a study of many hundreds of chole cystenterostomies whether after all it is not the operation of choice

The *contra indications* are (1) cancer or other gall bladder neoplasms (2) gangrenous cholecystitis (3) atrophic or contracted gall bladder and (4) cystic duct occlusion or ob struction other than stone

The *indications* are

1 Common duct obstruction in patients who are poor surgical risks from extreme ill ness complications or associated physical diseases When safety first is regarded cho lecystenterostomy is the best remedial meas ure available (3)

2 Residual hepatic duct stones when sec ondary common duct obstruction is a prob ability In these cases cholecystectomy is contra indicated and also cholecystostomy because a continuous and perhaps complete external flow of bile may result (3)

3 Chronic or intermittent jaundice of ob scure origin or jaundice secondary to in operable diseases of the liver pancreas or duodenum causing obstruction to the com mon duct (3)

4 Perforation of the gall bladder Chole cystenterostomy is safer than cholecystec tomy and gives a more rapid convalescence than cholecystostomy (3)

5 External drainage consequent to opera tions on the upper abdomen after the removal

of gall stones Anastomosis is safer and simpler (3) as illustrated in Case 4

6 Perforation of a pyloric or duodenal ulcer The chance is lessened of constricting the lumen and promoting healing of the ulcer area by bathing it continuously with the alkaline bile (3)

7 Persistent pylorospasm from hyperacidity unrelieved by medical treatment (3)

It is claimed by Sippy that the alkalinity of the bile is insufficient to counteract the persistent gastric hyperacidity The hydrogen ion concentration of gastric juice is 1 0 that of bile from the gall bladder is 7 4 The average *daily secretion of gastric juice is 1 500* cubic centimeters The average daily secretion of bile is approximately 1 000 cubic centimeters It therefore follows from its hydrogen ion concentration and from the relative *amounts secreted that the contention of* Sippy is justifiable since it would take even to nine times as much bile to completely neutralize the gastric juice as that secreted However this contention is largely academic since *many other factors enter into the neutralization* of gastric acidity notably the ingestion of protein foods

8 Acute pancreatitis Cholecystenterostomy permits of free drainage of bile yet conserves it for the patients use and *is to be* preferred to either cholecystostomy or cholecystectomy In Case 12 cholecystoduodenostomy was done for this condition with excellent immediate and remote results

Cholecystenterostomy *should supersede* cholecystostomy as a routine measure because since bile follows the path of least resistance frequently in inflammatory conditions of the bile ducts following cholecystostomy practically *the entire output of the liver* is lost in drainage and a condition of acholia results with the gravest consequences to the patient death usually supervening We have had personal experience with such cases with fatal issue and in other cases *have felt that* death was avoided by the performance of a cholecystenterostomy particularly in Case 16 of this report

It should also supersede choledochotomy or plastic surgery in cases of *stricture (other* than stone) of the biliary ducts as being a simpler safer and equally efficient method in its final outcome for remedying the conditions named It is tersely stated by White (21) that cholecystenterostomy invariably helps *a patient in very grave straits* and provides a simpler way out for the surgeon

A serious consideration of the above indications is pertinent at this time because the study of thousands of cases of gall stone *operations shows that less than 75* per cent of the cases operated on are cured The Mayos report 53 per cent cured following cholecystostomy and 71 per cent following cholecystectomy The chances are greatly *lessened for relief of the 25 or 30 per cent of* ectomies who are subjected to second operations because the previous removal of the gall bladder prevents the utilization of the gall bladder as a shunt circuit duct or the *provision of a dual opening for the escape of* bile from the hepatic duct

The majority of surgeons are choosing cholecystectomy rather than cholecystostomy as a routine measure but no contention will *be made in this paper as to the relative value* of the two operations Statistically cholecystectomy as a routine is preferable but since both have such a high percentage of failures it is apparent that some better meth *od is greatly needed Possibly with increasing* numbers of cases reported cholecystenterostomy never a popular procedure though introduced as early as 1880 may yet be in the ascendancy as the operation of choice in gall *bladder surgery It covers a very wide range* of useful application apparently without the disadvantages of either cholecystectomy or cholecystostomy Probably experience will prove that it is as useful in gastric ulcer as is *gastro-enterostomy* As a routine measure in the hand of the less skilled it will occupy a position of greater safety than either cholecystectomy or reconstructive duct surgery

The 20 cases presented cover a varied appli *cation of this operation Determinative* conclusions cannot be drawn from this number of cases but when these are added to those already on record and to those which may be reported and when a careful study of the *end results is made* the true value of the operation may be correctly estimated

The operative technique described has been efficient in all of the cases reported and in no case has there been a leakage or failure from a technical standpoint

A rubber tube No 16 or 18 French scale is inserted into the fundus of the gall bladder and held by a catgut purse string suture which passes through all coats of the gall bladder and transfixes the tube itself to hold it in position The first suture is also a hæmostatic suture A second running Lembert circular suture invaginates the first suture line The gall bladder is then attached to either the stomach or duodenum by a linen or Pagenstecher thread For obvious reasons care is exercised to avoid traction on either the duodenum or stomach at the point of approximation Sometimes a cholecystogastrostomy is out of the question because of the relative position of the stomach and gall bladder In these instances a cholecystoduodenostomy is the operation of necessity rather than of choice

As soon as this line has completely approximated the gall bladder and stomach or duodenum a second suture of catgut is similarly placed the ends being left long Three sutures are introduced into the stomach or duodenum in such a way as to make a triangle the center of which is the proposed opening into the stomach or duodenum With these held taut by slight traction on the tube in the gall bladder an incision is made through the serous and muscular coats down to the mucous membrane The mucosa is caught up and held between two forceps and opened the clamped end of the rubber tube is inserted and a circular purse string introduced into the mucosa is drawn tight and tied This is a hæmostatic as well as a fixation suture most important because of its hæmostatic effect A second purse string suture of catgut runs through the serous and muscular coats and invaginates them over the tube and is tied and the ends are then tied to the second gall bladder purse string the ends of which were also left uncut The peritoneal coats of the stomach and gall bladder are then closely approximated by continuing and completing the catgut suture uniting the gall bladder to the stomach and the original linen suture is also completed approximating the gall bladder and stomach

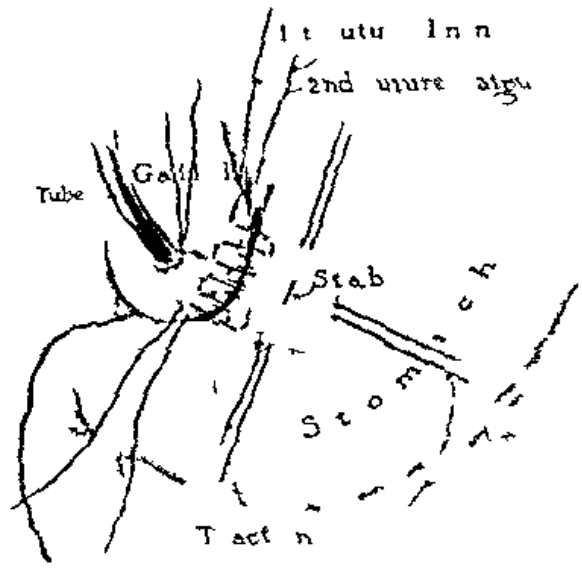


Fig. 1.—Tube inserted into fundus of gall bladder and first and second row of fixation suture in place.

securely This constitutes the fourth tier of sutures around each stoma the second tier uniting the stomach to the gall bladder An omental graft is then placed entirely around the suture line for complete protection

Judging from the end results of several hundred cases of my own and of many other surgeons I believe that gall bladder surgery even in the hands of the masters in this field is the least satisfactory of all surgery except that of the brain

It is urged that a more intensive study of these cases and of contributions on this subject be made for the purpose of standardizing the teaching of gall bladder surgery We must rely finally on the judgment of the individual surgeon as to when the gall bladder should be removed when it should be drained and when it should be anastomosed either with the duodenum or stomach The soundness of this judgment has as its basis either a wide personal experience or the adoption of a standardized surgical procedure

When an operation is done as a last resort in an unfavorable case and is followed by unexpectedly good immediate results and gives long continued freedom from somatic symptoms the surgeon will remember that operation with pleasure Repeated experiences with so good a means in times of dire need will increase its estimated value Varied

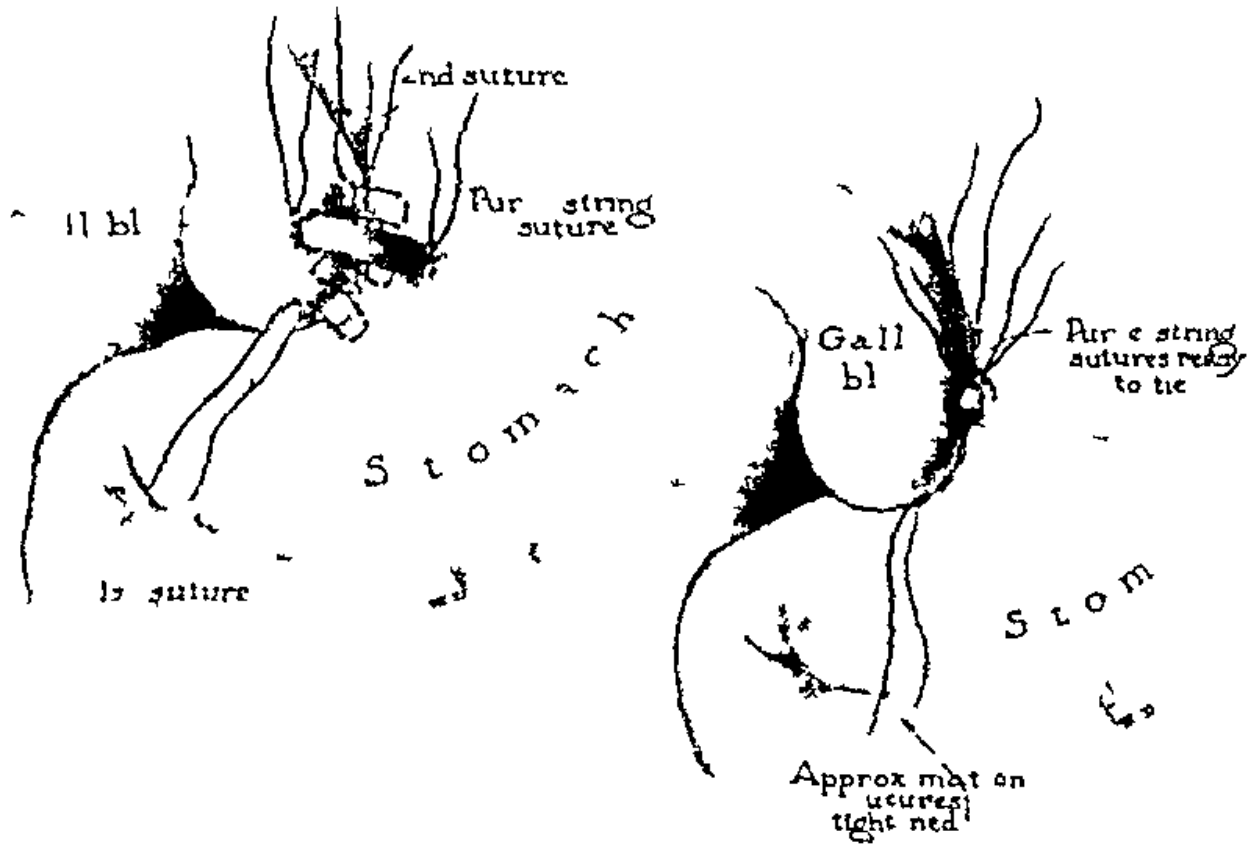


Fig. 2.—The gall bladder being brought into position preparatory to tightening the approximating suture.

application under like conditions with unvarying success will cause an appreciation which must express itself. With this explanation I beg your pardon for the effort if it may be so considered of seeking to popularize the operations cholecystogastrostomy and cholecystoduodenostomy.

EPITOME OF CASES

CASE 1.—Mrs. W., age 65 years, came in March 1911 with jaundice. A diagnosis was made of suppurative gall bladder with stones. The patient collapsed under the general anesthetic. The interrupted operation consisted of simple drainage of the gall bladder with removal of stones. A biliary fistula persisted 3 months. At a second operation, June *1911*, all stones were removed, including one in the common duct. A biliary fistula persisted over a *period of 2* years. The health was very poor. At times the patient had white stools, at other times there was bile in the stools. When the fistula closed *chills and fever supervened. In May 1913* a cholecystoduodenostomy was done. Complete relief from *all symptoms* and general improvement in health followed. The patient *was well in 1923*.

CASE 2.—Mrs. D. A. K., age 60 years, was operated upon January 28, 1916, for recurrent and almost chronic jaundice. She was emaciated and enteroptotic. Pain and other symptoms were confined to the upper right quadrant. The pre-operative diagnosis was cholecystitis probably with *stones. At operation no stones were found.* The gall bladder was thickened. There were no adhesions. Cholecystoduodenostomy was done. The convalescence was uninterrupted. Except for pneumonia in 1919 she has been in perfect health, has gained 40 pounds in weight and has complete relief from all symptoms.

CASE 3.—Mrs. B., age 45 years, had had digestive disturbances and recurrent gall bladder attacks attended with fever and jaundice for years. Operation was performed July 23, 1917, for removal of stones from gall bladder and cystic duct, no obstruction *being found in the common duct. Cholecysto*duodenostomy was done. The convalescence was uninterrupted. When last heard from in 1922 she had had no recurrence of any symptoms.

CASE 4.—Mrs. G., age 40 years. On March 26, 1917, a pre-operative diagnosis was made of chronic appendicitis, lacerated perineum and retroversion *of uterus. During the course of the operation* gall stones were found and because digestive disturbances were in the ascendency a cholecystogastrostomy was done, coincident to the removal of the appendix, suspension of the uterus, repair of the perineum and extraction of diseased teeth. *In*

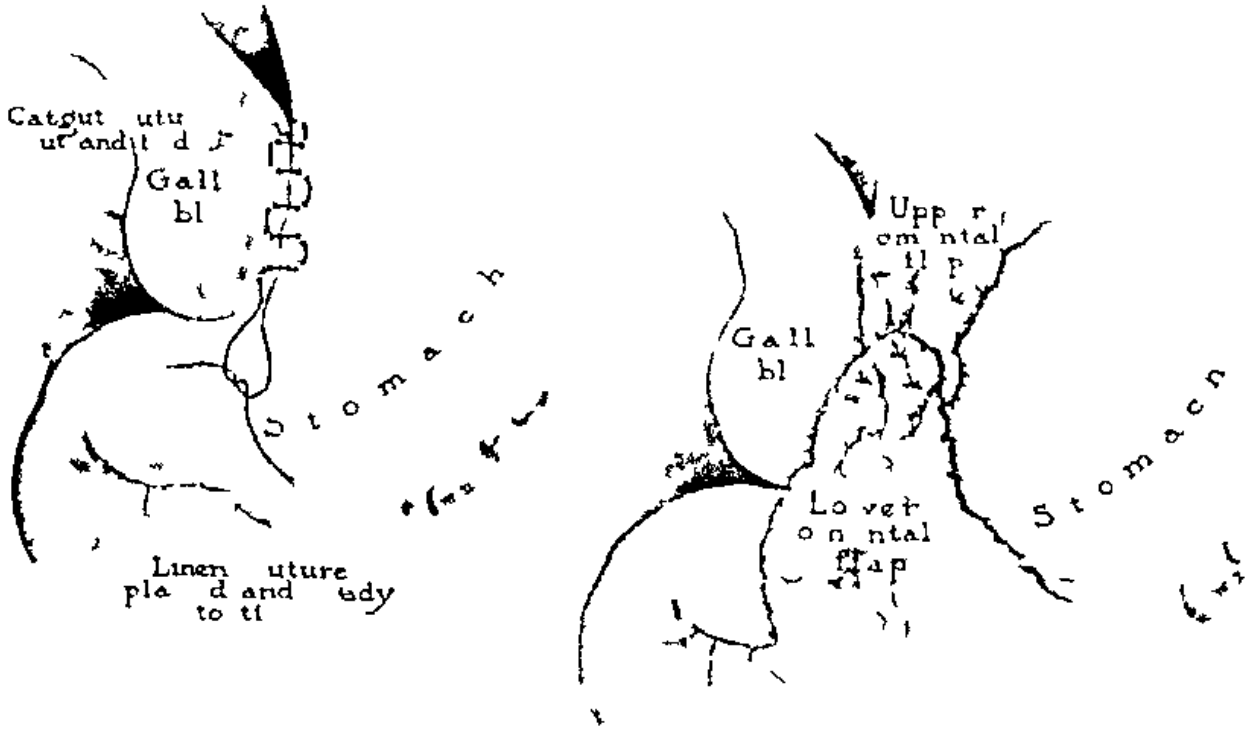


Fig 3 Final operation

spite of the multiplicity of surgical operations she had a perfectly normal course and has been entirely relieved symptomatically

Case 5 Mrs H age 50 years suffered from recurrent gall bladder colic with slight jaundice occasional fever gas belching and digestive disorders in the intervals between attacks At operation February 26 1918 stones were removed from the gall bladder and cholecystogastrostomy was done She reported complete relief from all symptoms in 1922 when last heard from

Case 6 Mrs W H W age 65 years was operated upon for gall stones on June 1 1918 The stones were removed and cholecystoduodenostomy was done An uneventful convalescence and complete relief from all symptoms followed

Case Mrs C R P age 55 years A preoperative diagnosis was made of chronic cholecystitis with stones She had had indigestion colic slight jaundice and fever (during some of the attacks) for a period of several years She was extremely nervous The general health was bad Operation showed thickened inflamed gall bladder with stones The stones were removed Cholecystoduodenostomy was done In 1923 the patient reported that she had been in perfect health since the operation

Case 8 Mrs J T H age 50 years A preoperative diagnosis was made of gall stone colic She gave a history of colic indigestion slight jaundice and sometimes fever during attacks Operation was performed July 1 1919 in an interval between attacks Stones were removed from the gall bladder Cholecystogastrostomy was done An uneventful convalescence followed There had been no recurrence of symptoms when she was last heard from in 1923

Case 9 Mrs R L R age 50 years was admitted to the hospital January 6 1920 For several years she had suffered with recurrent attacks of gall bladder colic The pre-operative diagnosis was acute cholecystitis with stones At operation the gall bladder was aspirated and the stones removed Cholecystogastrostomy was done Rapid and unusually smooth postoperative recovery followed and she reports complete absence of all symptoms for the 3 years since

Case 10 Mr W T A age 45 years had jaundice during the Spanish American War while serving as a soldier His health and complexion were bad He had recurrent attacks of upper right abdominal pain Colic and digestive disturbances continued Pre-operative diagnosis of gall stones was made Cholecystotomy with removal of stones was done in 1913 and was followed by very little relief from any symptoms A second operation was done June 21 1921 under local anaesthesia Two stones of moderate size were removed from the gall bladder at this time The common duct was not obstructed Cholecystogastrostomy was done and postoperative hernia was coincidentally repaired In the two and

one half years since the operation the patient has been in robust health All digestive and other symptoms have disappeared without a recurrence in the interval since operation

CASE 11 Mrs W S age 65 years was admitted *to hospital February 1 1921 with* pre-operative diagnosis of gall stone colic The stones were removed Cholecystotomy was done The symptoms recurred and she was admitted September 22 1921 During the interval between operations she had had gall bladder attacks indigestion sense of weight over gall bladder and slight jaundice At the second operation September 22 1921 cholecystogastrostomy was done under local anaesthesia Except for an attack of pneumonia in 1923 she has *been in perfect health since this operation*

CASE 12 Mrs H H T age 45 years was operated upon for gall stones April 1921 Many small stones were removed Cholecystotomy was done She was readmitted to the hospital August 1921 with right upper and epigastric pain nausea vomiting and elevation of temperature A mass was felt in the right epigastric region Preoperative diagnosis of pancreatitis was made There was a very large pancreas Operation confirmed the *diagnosis of no stones in the gall bladder or common* duct Cholecystoduodenostomy was done Rapid convalescence followed She was discharged 19 days after operation She reported no recurrence of any symptoms whatsoever up to December 1923 and a gain of 30 pounds in weight

CASE 13 Mrs McC age 48 years was operated upon *December 1921 for stones Cholecystotomy* was done Up to date abdominal pain indigestion slight flatulence occasional nausea and vomiting continued A second operation was performed January 26 1922 No stones were found There were no unusual adhesions but some were found between the gall bladder and abdominal wall Cholecystgastrostomy was done Up to *December 1923* she has been permanently relieved of all digestive symptoms has gained flesh and the complexion is clear

CASE 14 Mrs J S J age 63 years The preoperative diagnosis was chronic lithiasis with stone in the common duct Operation was performed December 28 1922 under gas-oxygen ether anesthesia There was a distended gall bladder the size of an orange filled with small stones One stone the size of a pea was in the common duct Stones were *removed A long incision was made in order* to remove the stone from the common duct The wound was sutured Cholecystogastrostomy was then done A rubber drain was carried through a stab wound Uninterrupted convalescence followed Discharged on the nineteenth day The patient reported complete relief from all symptoms *December 1923*

CASE 15 Mr I H age 60 years March 9 1923 The preoperative diagnosis was chronic cystitis *There had been* typical gallbladder colic at intervals of every two or three months for several years Each attack was attended with jaundice rather pronounced At operation a thickened gall bladder was found with *no stones either in the gall* bladder cystic or common duct *There was a* slight obstruction which was probably a stricture just below the junction of the hepatic and cystic ducts Cholecystogastrostomy was done Convalescence was uninterrupted and the jaundice cleared up There was some slight digestive disturbance *six months after operation but no attacks* of jaundice and no trouble referable to gall bladder occurred after operation The patient was heard from in November 1923

CASE 16 Mr P O F age 73 years The preoperative diagnosis was suppurative cholecystitis and cholelithiasis The patient had had fever and *jaundice Operation* was performed May 24 1923 under local anaesthesia A very large gall bladder was found filled with stones and pus One stone measured 2 inches in diameter The stones were removed and cholecystostomy was done The postoperative convalescence was rather stormy attended with delirium and after the fifth or sixth day enormous amounts of bile were drained out The patient's condition seemed good except for an increasing debility On account of his age and from *previous experience I was afraid of complete acholia* with a fatal outcome On June 5 1923 under local anaesthesia cholecystogastrostomy was done Twenty four hours later the stools which had been white were bile colored Uneventful convalescence followed December 1923 the health was good

CASE 17 Mr D S W age 45 years was admitted *to the hospital with temperature of 104 degrees* and sweats He was severely jaundiced and had right upper abdominal pain Seven years before he had been operated on for appendicitis and had had his gall bladder drained The preoperative diagnosis was acute suppurative cholecystitis with stones At operation June 26 1923 under local anaesthesia a distended *thickened gall bladder the* size of a large hen's egg was found containing bile and pus The common duct was found to be stricture Two stones were in the common duct there was no pancreatitic enlargement Cholecystogastrostomy was done Temperature was normal on the third day Convalescence was rapid and uneventful *In December 1923* he gained 20 pounds in weight and is now in better health than at any time in the last 10 years

CASE 18 Mr I V age 64 years had had cholecystotomy and appendectomy done in 1917 with temporary improvement followed during the past 3 years by recurrence with increasing severity of indigestion heartburn eructations of gas slight *jaundice* and irregular fevers He has been under treatment by various stomach specialists duodenal tubing of the gall bladder being done Each treatment was followed by slight improvement which persisted for several months with a recurrence of all previous symptoms After a gastrointestinal X-ray examination and other routine examinations *it was* found that his liver was definitely enlarged and

tender On account of an unusual amount of epigastric pain it was thought best to operate after a period of observation in the hospital He had two severe attacks of dyspnœa with profuse sweating pallor and weakness of pulse These attacks were thought to be due to gall bladder colic or pyloro spasm Atropine was followed by relief in each instance When the abdomen was opened June 30 1923 under gas-oxygen ether anæsthesia a few dense adhesions were found between the gall bladder and abdominal wall a result of previous operation and some adhesions between the gall bladder and stomach and duodenum The gall bladder was thickened and distended but no gross pathology was discovered There were no stones and no signs of ulcer of either stomach or duodenum Cholecystogastrostomy was done The postoperative course was smooth and uninterrupted until the fourth day when he suddenly had a profuse hæmorrhage apparently from his stomach and died Post mortem examination showed aneurism of the aorta had eroded into the œsophagus just above the diaphragm Anastomosis between the gall bladder and duodenum was found to be firm and satisfactory There were no signs of infection of peritonitis The cause of death was an unrecognized aneurism of the aorta This is the only death in the series and should not properly be classed as such in this report

CASE 19 Mr C M J age 54 years had chronic jaundice and had had two severe attacks of acute jaundice and several attacks of right upper abdominal pain The preoperative diagnosis was cholecystitis cholangeitis and chronic appendicitis Operation was performed August 3 1923 under gas oxygen ether anæsthesia The gall bladder which was very thin was distended The liver was enlarged The appendix had a dense adhesion at the base Appendectomy and cholecystogastrostomy were done with anastomosis about ¼ in above the pylorus Uneventful convalescence followed He was discharged 21 days after operation The jaundice completely disappeared

CASE 20 Mrs W R age 59 years was operated upon years ago for pelvic inflammation She was in poor health previous to and following the operation She had repeated attacks of acute indigestion some of which were attended with rigors and elevation of temperature She has had three definite attacks of jaundice one having been very severe The pre-operative diagnosis was acute cholecystitis with stone made May 1923 after complete gastrointestinal X ray and other examinations The patient refused operation until after an acute attack November 20 1923 attended with rigors fever and jaundice The diagnosis at this time was acute suppurative cholecystitis Operation was performed under local anæsthesia The gall bladder contained 190 stones with white bile No stones were found in the common duct The stones were removed and cholecystogastrostomy was done Convalescence was uninterrupted

CASE 21 Mrs J B P age 60 years had repeated attacks of gall bladder colic attended with slight jaundice A complete X ray examination was made 2 years previously with a diagnosis of chronic cholecystitis probably with stone During the 2 years she had had three or four attacks of gall bladder colic each attack attended with slight jaundice and there had been fever in the last attack November 30 1923 a cholecystogastrostomy was done No stones or other signs of obstruction were found in the biliary tract The head of the pancreas and stomach were normal The cause of the gall bladder colic was obscure with reference to everything except the gall bladder itself which was bilocular A partition of membrane probably of inflammatory origin made the gall bladder bilocular This no doubt was the cause of her attacks of colic as the opening between the two sections of the gall bladder was too small to admit a drainage tube The partition was incised and sutured around the tube The convalescence has been uninterrupted

No final report can be given as the patient is still in the hospital

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SARCOMA OF THE FALLOPIAN TUBE

HISTORY AND LITERATURE

BY W E DODD M D PHILADELPHIA

IN *1886 Senger (1) described a primary* small round cell sarcoma of the fallopian tubes Up until this time it was generally believed that malignancy of the tube did not occur It is true that Doran (2) had described a case which Senger refers to as possibly being a carcinoma of the tube but in Doran s article the tumor is claimed to be benign and there is no proof of malignancy Schroeder (3) in his textbook expresses well the current belief of the time by not mentioning tubal sarcoma at all and stating that carcinoma is never primary in the tube and only exceedingly rarely as metastasis To Senger therefore belongs the *credit not only of describing the first primary* sarcoma of the tube but also of describing the first primary malignant neoplasm of that structure However exception has been taken *to Senger s claim* Coe (*American System of Gynæcology* II 894) refers to the case and doubting the correctness of Senger s diagnosis states that there is no authentic case of sarcoma of the fallopian tube on record Nine days after Senger published his article Gotts chalk (4) reported a case before a medical and scientific audience in Berlin of small spindle cell sarcoma occurring as a primary growth of the right tube The case appeared in the literature the following month

In May 1889 J E Janvrin (5) of New York reported a primary sarcoma of the fallopian tube which he affirms is either a composite fibrosarcoma or a composite myxosarcoma

In 1890 M Sanger (6) reported a primary small round cell sarcoma of the tube with decided co operation of the epithelial elements

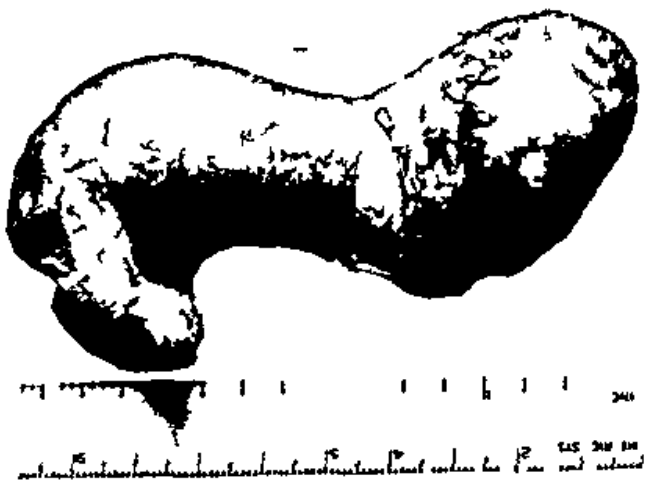


Fig 1 Side view of the specimen



Fig 2 View opposite the attachment of the mesosalpinx

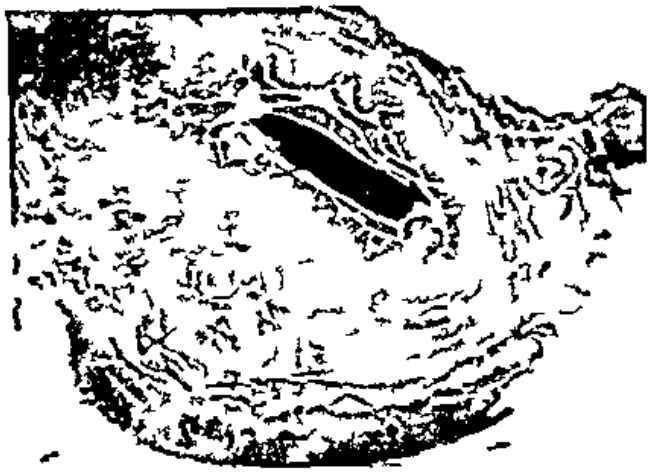


Fig 3 Cross section of the specimen at its proximal end The specimen is 9 centimeters in width from 7 centimeters to the proximal end to 4 centimeters at the distal



Fig 4 A higher power of the cross section taken near proximal end showing the single layer of columnar epithelium covering the fold of mucosa

In 1893 C D Jones (7) reported three cases of sarcoma (myelomata) of the fallopian tube Two of them were considered primary while the third was considered as probably secondary These three cases were from women who had died suddenly from internal hæmorrhage and whose clinical history was not published The first case he considers a large round cell sarcoma From his histological studies he believes that the endothelium of the capillaries the smooth muscle fibers of the musculature of the tube the smooth muscle of the wall of the arteries and fat cells just beneath the peritoneum have all simultaneously given rise to starting places for transformation into sarcomatous tissue In support of this view he published drawings from his histological preparations The second case is described as a large spindle cell sarcoma The third case which he considers as possibly secondary is that of a melanotic sarcoma The view advanced in discussion of this tumor namely that white fibrous connective tissue first liquefies and then out of this indifferent liquefied protoplasm the tumor cells develop *de novo* can hardly be accepted today

In 1897 Jacobs (8) in Belgium and von Kahlden (9) in Germany each reported a case of primary sarcoma of the tube Jacobs gave no description of a microscopic study of his tumor but von Kahlden's might be considered as an endothelioma with giant cell formation Von Kahlden's article is quite comprehensive The previously mentioned writings of Senger Gottschalk Janvrin and Sanger are practically copied verbatim and commented upon while the three cases reported by Jones are not accepted as authentic on the ground that they



Fig 5 Wall of tumor adjacent to the edge of muscularis



Fig 6 Photomicrograph of a section of the tumor base

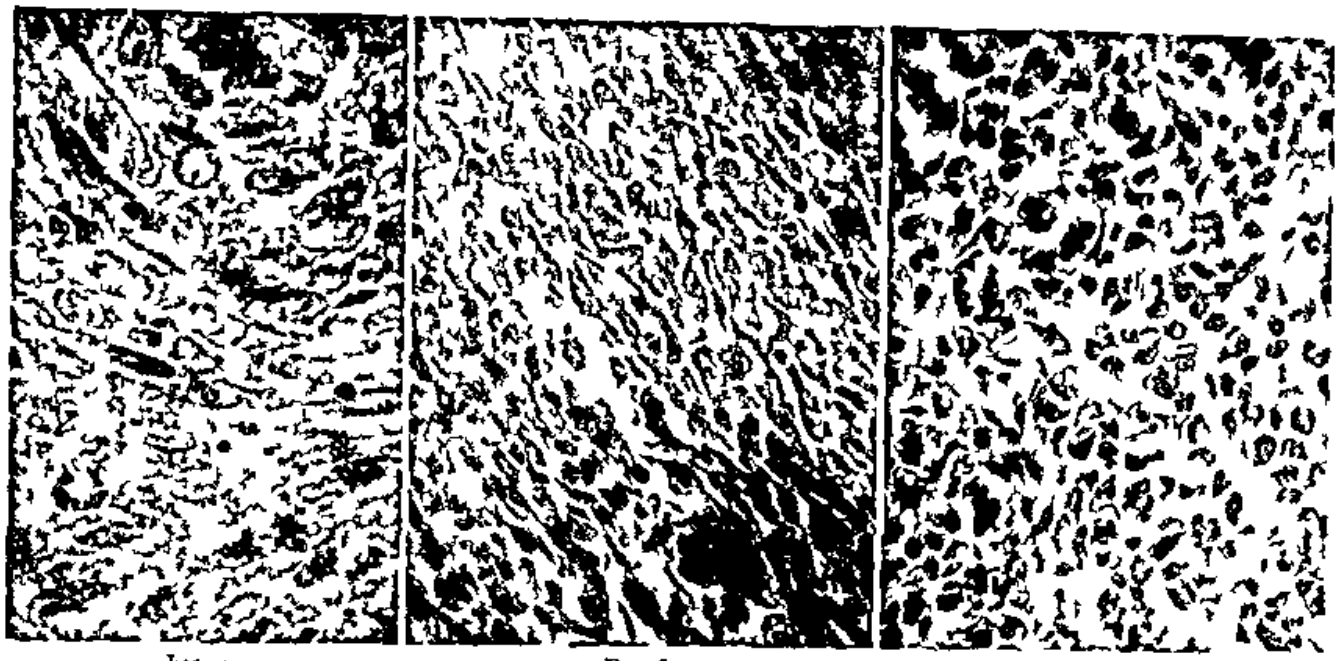


Fig 7 Fig 8 Fig 9

Fig 7 Photograph of tumor showing papillary structure

Fig 8 Section made of the primary growth of the tube showing papillary character of the growth

Fig 9 Section of metastatic nodule which was found implanted upon the wall of the small intestine at the uterine pole of case shown in Fig 7 showing papillary character to those of the primary growth

were uncertain preserved specimens from unknown cases In reference to Sanger's case in which decided co operation of the epithelial elements is mentioned von Kahlden believes that the so called epithelial elements are merely groups of endothelium similar to the endothelium which he observed arising from the lining of the lymph vessels

In 1905 Jacobs (10) reported a second case of primary sarcoma of the tube which he described as a myxosarcoma and referred to Janvrin (5) as having reported a similar case

In 1909 F J McCann (11) reported a primary sarcoma of the mesosalpinx consisting of round and oat shaped cells

In the same year A Gosset (12) reported a primary tumor of the fallopian tube which he calls a Perithelioma The exact nature of this tumor does not seem clear The author states that two interpretations may be put upon it First that it is a papillary carcinoma and secondly that it is a sarcoma with merely an epithelial covering One pathologist (Waldeyer) called it a plexiform angiosarcoma while Dr Barnell of Pasteur Institute Paris called it a perithelioma

In 1911 Weinbrenner (13) reported a tumor of the tube which he also calls a primary perithelioma In the first part of his article he calls it a typical angiosarcoma (perithelioma) but states that more careful microscopic studies show it to be a tubal carcinoma of the alveolo papillary type

In 1912 Clara Eglington (14) published a case of primary mesothelioma of the tube In her commentary she states It is difficult to determine the exact nature of this tumor The individual cells look like sarcoma while the arrangement is like carcinoma She points out that the muellerian duct is of mesothelial origin and that the lining of the fallopian tube is a direct derivative of the mesothelium Whether the lining epithelium of the fallopian tube is of mesothelial origin or whether it is formed by an ingrowth of the epithelium from the cloaca as mentioned by Adami (15) I feel incompetent to discuss Eglington applies the term mesothelioma to those tumors of the fallopian tube of intermediate structure between sarcoma and carcinoma

In 1917 Bello (16) reported a case of primary sarcoma of the tube

Though the literature contains but few cases of primary sarcoma of the tube the cases of secondary sarcoma of this structure re

corded are still less in number Perhaps this is due to the fact that secondary tumors of any given structure as a rule do not awaken the same amount of interest that primary tumors do and are therefore not reported The following cases of secondary sarcoma are all that could be found The reader will recall that one of the cases reported by Jones (7) was regarded as possibly a secondary growth

In 1905 Orthmann (17) reported a fibro sarcoma mucocellulare which was primary in the right ovary and had extended to the right tube In 1910 Wohasugi (18) reported a primary endothelioma of the peritoneum with metastasis to the mucosa of both tubes In 1913 Chiari (19) reported a case of general sarcomatosis resulting from a primary small round cell sarcoma of the axilla Both fallopian tubes were involved In 1919 Buchler (20) in writing upon sarcomata of the uterine appendages which contain hyaline cylinders the so called cylindromata reported a small round cell sarcoma of the left ovary with metastasis throughout the abdomen including implantation to both tubes

If we summarize the cases of sarcoma of the fallopian tube thus far reported we find that there are only twelve cases in which we can feel at all certain that they were primary growths three are of doubtful character and five are secondary (No doubt the number of secondary cases are more numerous but they have not been reported)

REPORT OF TWO ADDITIONAL CASES

CASE 1 January 24 1921 a single woman age 55 was admitted to the Lankenau Hospital with the following history

For the past 6 monthes there has been a constant watery discharge from the vagina becoming blood stained during the past 2 months There was no pain but an occasional spell of indigestion Three attacks simulated cholecystitis during the past 3 years The bowels were constipated There was no loss of weight to her knowledge She feels nervous at times had influenza in 1918 menopause in 1911 complete The physical examination was negative with the exception of a vague resistance over the entire right side of the abdomen and slight suprapubic tenderness There was no muscular rigidity Pre-operative diagnosis was tubo-ovarian inflammatory disease

Operation January 26 1921 Dr John B Deaver The right tube was found dilated and a soft cauliflower like growth the size of an olive protruded from the fimbriated extremity The right tube was excised with the tumor Ovaries left tube and uterus were normal The patient made a good post operative recovery

The patient did well and gained weight for one year following operation then no further record of her was obtained

Pathological studies Grossly the specimen consisted of a trumpet shaped body somewhat curled upon itself measuring 9 5 centimeters as it lay on the table and 13 5 centimeters if the convolutions of the tube were followed It varied in width from 0 7 centimeters at its proximal end to 4 centimeters at its distal end A definite mesosalpinx was attached along its proper side On section passing from the proximal toward the distal end the tube grew more and more dilated and contained a sero hæmorrhagic fluid The longitudinal convolutions of the mucosa became less numerous and finally disappeared The musculature of the wall thinned out as the tube became more and more dilated About 6 centimeters from the proximal end the sero hæmorrhagic fluid which had filled the lumen gave way to a friable pink tumor mass which distended the tube still further and finally bulged from the fimbriated extremity At the point where the tumor first began the mucosa had already entirely disappeared and the tumor lay against the thinned out muscularis (Fig 5)

The histological examination showed that the tumor consisted of spindle and oat shaped cells There was very little intercellular connective tissue and the numerous small blood vessels had scarcely more than an endothelial lining From the microscopic appearance of the cells from their great number their densely stained nuclei with frequent mitotic figures from their combing there is little doubt that it was a spindle cell sarcoma (Figs 6 and 7)

The exact point of origin cannot be positively established but it arose probably either from the submucous connective tissue or from connective tissue in the adventitia of a blood vessel

CASE 2 February 20 1920 a married woman age 60 was admitted to the Lankenau Hospital She had felt weak and in ill health for the past year Eight days before admission to hospital she began to have a bloody discharge from the vagina The menopause took place 8 years previously She had had two children Vaginal examination revealed a vague mass on either side of the uterus At operation both tubes were found dark in color and distended Tubes ovaries and appendix were removed

Pathological studies The right tube was doubled upon itself and held by adhesions It measured 11 centimeters in length and from 3 to 5 centimeters in width The contents were sero hæmorrhagic fluid under tension The serosa was dark blue in color the mucosa was smoothed out and the wall measured 0 5 centimeters in thickness Microscopical examination revealed a spindle cell sarcoma in the wall

(Fig 8) There were no pathological changes in the ovary left tube and appendix

On March 12 1922 the patient was re admitted to the hospital She had lost considerable weight was anæmic and physical examination revealed a large hard irregular nodular tumor mass occupying the lower part of the abdomen Death occurred on March 17 and at autopsy the lungs were found studded with tumor nodules The mass in the abdomen proved to be a tumor which had been diffusely scattered throughout the abdominal cavity At the time of operation no pathology other than that described in the fallopian tube was found so the conclusion is drawn that the right tube was the site of the primary tumor Microscopically this tumor consisted chiefly of spindle shaped cells arranged in the typical combed fashion quite vascular and with abundant mitotic figures Sections from the recurrent growth obtained at autopsy from the abdominal cavity and from the lungs showed that the cells were of similar character to those found in the primary growth with the exception that sections were more highly cellular and greater numbers of cells showed degenerative changes

SUMMARY

A review of the literature on primary sarcoma of the tube reveals 12 authentic cases

Since 1900 there have been 1 871 salpingectomies performed at the Lankenau Hospital most of which have been bilateral All of these specimens have been studied both grossly and microscopically and these are the only two cases of sarcoma in our records An interesting point is the fact that both of these patients in whom the tumor occurred were past the menopause one being 55 years and the other 60 years of age

I wish to express appreciation and thanks to Dr J B Bland Sutton Dr Stanley P Rigby for permission to report these cases

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THE MOTOR SIGNIFICANCE OF HÆMANGIOMA

With the Report of a Case of Plexiform Telangiectasis of the Sciatic Nerve and its Branches [1]

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As an orthopedic or neurological problem hæmangiomata are quite uncommon. Thus the records are few and scattered. The guises in which angiomata come are varied, the diagnosis sometimes difficult, the outcome occasionally disastrous, and the therapy greatly befogged. Therefore a careful study of the whole problem from the standpoint of the surgeon has been undertaken.

DEFINITION

Hæmangiomata are neoplastic overgrowths of blood vascular tissues. Varicosities, aneurisms and redundant granulation tissue are therefore excluded. According to the best authority (33, 40, 20, 10, 29) angiomata are made up of endothelial lined spaces of various sizes, the outer portion of the vessel walls generally being absent. It would seem that there is an endothelial proliferation of the intima, some segments of the vascular system of certain individuals presenting endothelial outbuddings from which new blood spaces originate. In certain specimens (9) there are seen lines of endothelial cells between which the blood corpuscles are pushing their way, thus indicating an extension of the angioma. According to the size of the spaces the growths are classified clinically and pathologically as (1) capillary and (2) cavernous. Besides these there is the peculiar form of (3) plexiform or racemose angioma which is made up of true vessels but in which there reside neoplastic characteristics.

ETIOLOGY

Hæmangiomata have certain peculiarities which are worthy of note. All the evidence leads to the belief that these tumors are congenital. It is true that the cavernous and racemose types usually declare themselves in the second or third decades, but this is no argument against the presence of the potential structures at birth. The appearance of an unsuspected tumor or the development of a recognized angioma is occasionally noted at puberty, sometimes subsequent to trauma, but more frequently without associated cause. Additional evidence of their congenital origin is found in the fact that a considerable number of cases have been reported in which the cavernous form has started from a pre existing birth mark. This is well illustrated by the patient of Konjentzny (18).

Case 1. A man, age 26 years, had a birth mark in the lower half of the left axilla. This remained stationary until one and one half years ago when it gradually extended. Now, as a cavernous angioma it occupies the breast, neck, back, and entire left arm.

Furthermore Fitzwilliams (1) in a study of 645 patients found that in 83.2 per cent the hæmangiomata were observed at birth, that in an additional 12.8 per cent they appeared within the first 3 years of life.

Patton (28) found that in 108 cases of hæmangiomata 16 per cent gave a history of a similar condition occurring in the family. Babbington (2) described a familial form of the capillary or telangiectatic type occurring on the mucosa of the nasal septum and characterized by profuse hæmorrhage. Steiner (35) in reviewing all reported instances observed that this familial type may occur in as many as five generations and may be transmitted and that it appears equally in either sex.

OCCURRENCE

Sex is a determining factor in the occurrence of the ordinary angiomata. In a series

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ANGIOMA OF JOINTS

Occasionally the angioma affects the joints interfering with their proper function O good (26) has recently published an illustration of such a condition in the knee joint and Haas (16) reviewing the German literature found 9 instances of the same condition All closely resemble an internal derangement of the joint or a foreign body In Osgood's case the preoperative diagnoses were as follows (1) lipoma arborescens (2) a tumor (3) tuberculous pannus (4) solitary gumma The only possible diagnostic test not used in this case was an observation of the effect of elevation on the tumor contents and joint action Even this test might be negative if sufficient reaction had occurred within the joint In one of Haas's patients an excision of the tumor was practised but there was a recurrence which destroyed cartilage and bone to a marked degree and because of this the joint was excised

ANGIOMA OF NERVOUS SYSTEM

Angioma of the nervous system may cause symptoms which will bring the patient to the orthopedic rather than the neurological surgeon This is well illustrated by a patient who came under observation in the Orthopedic Clinic at the Children's Hospital of Los Angeles So far as can be ascertained this is one of the few cases in the literature in which it can be definitely said that the tumor and its symptoms chiefly concern the peripheral nerves

CASE 6 W H W a male aged 10 years was admitted to the hospital in September 19 His *chief complaint* was that he walked lame The child was normal at birth At 10 months a lump was noted in the lower part of the right leg Later three other lumps were observed When he was about 4 years old these masses were seen to be increasing in size and spontaneous pain appeared which was not relieved by position This was followed by a flexion deformity of the knee which resulted in a definite limp X rays were negative A specimen removed for diagnosis in 1918 was thought to be a varix by the surgeon The leg was placed in traction and straightened but the deformity recurred immediately when traction was removed In spite of negative Wassermanns he was placed on antiluetic treatment without result The pain has not been continuous but the deformity and limp have persisted to the present time Recent attempts to straighten the leg forcibly induced severe pain The child is more comfortable when holding the leg in the manner illustrated in Figure 1 He has been excluded from school because of pain and deformity

The past history was unimportant

The family history was negative so far as similar condition is concerned

The mother has a speech defect

Physical examination shows an undernourished nervous child who seems to be somewhat below par mentally The general examination is negative except for absence of tonsils and some enlarged submaxillary glands on the left side

Stance The patient stands with round shoulders left list and slight right dorsal left lumbar functional scoliosis The right hip and knee are usually flexed and externally rotated The right foot is held in equinovalgus The right leg is supported at the knee by the hand (Fig 1)

Gait The patient has a hitching gait and fails to place the weight squarely on the right foot (Fig 2)

Surface anatomy No marked changes are observable in the surface contour of the right thigh The right knee is flexed to about 90 degrees The periarticular tissues are atrophic the patella is small and there is no evidence of joint effusion The contour of right leg is rather lumpy (Fig 1) There is a scar over the upper end of the tibia about 7 centimeters long and medial to this is a distinct lump about 9 centimeters further down the tibia is another small lump Over the head of the fibula there are several small bluish areas averaging less than 0.5 centimeter in diameter These become distinctly swollen when the limb is dependent The lower portion of the belly of the gastrocnemius is enlarged and there is a distinct tumor about 4 centimeters in diameter at the upper end of the tendo achillis There is a distinct decrease in the development of the right foot but no changes of further note

Palpation The thigh is negative except that in the course of the sciatic nerve one gains the impression of several deep seated nodules which are distinctly tender This is especially true at the upper end of the popliteal space where it was thought a definite mass could be felt It is apparently about centimeters in diameter firm smooth nonadherent and pressure causes pain and spasm of the muscles around the knee In the course of the peroneal nerve several small firm tender masses can be palpated but no pulsation can be determined in this area In the region of the scar there is a distinct lump about 2 centimeters in diameter which is smooth not adherent to the skin and tender The mass on the medial side and lower end of the tibia has the same general characteristics The mass at the lower end of the gastrocnemius gives one the impression of being located within or beneath this muscle No definite form can be made out and it would seem to be adherent to some of the deeper structures It is firm and distinctly tender The

mass in the region of the tendo achillis is about 4 centimeters in diameter very dense elastic and somewhat movable but is not concerned with the tendo achillis These tumors are all present in either dependency or recumbency and no change in their character can be determined with a change in position

Joint motions The hip is actively and passively movable throughout its normal range

The knee cannot be flexed to within 20 degrees of normal This block seems to be due to pressure within the popliteal space causing pain Extension lacks 75 degrees of being complete and is stopped by muscle spasm

Foot Actively and passively the foot is capable of a full range of motion but the reaction is neither prompt active forceful nor sustained

Muscle examination This is unsatisfactory because of the child being inattentive but it would seem that all the muscles below the knee are of less than normal rating The peroneals seem to be stronger than the tibials

Neurological examination Reflexes are normal in both legs and no pathological reflexes can be obtained Sensation seems to be interfered with to a slight extent for light touch from the knee down Pain temperature and deep sensation are normal There is slight but distinct anisothermia the affected leg being the cooler

Pigmentation and skin The right leg is distinctly more pigmented than the left and shows a peculiar mottling The hair follicles seem to be white surrounded by a pigmented zone the pigmented zones in turn being separated by white lines The skin of this side seems rougher than on the left

Blood vascular system Beside the venous enlargements noted above the posterior tibial pulse on the right seems to be smaller than on the left Blood pressure in recumbency left leg 134 90 right leg 118 90

Measurements There is 5 centimeters of atrophy of the right thigh the right leg is 2 5 centimeters larger than the left 1 centimeter of shortening of the right tibia the right foot is 3 centimeters shorter than its fellow and 1 centimeters narrower

Glands A few small nonadherent glands can be palpated in Scarpa's triangle

Laboratory tests Wassermann tests of child and parents were repeatedly negative Tuberculin test was negative Blood picture showed nothing remarkable

Diagnosis (tentative) Multiple neuromata of the sciatic nerve and its branches Exploratory operation advised

Operation September 1922 The sciatic nerve was exposed from the sciatic notch to the upper limit of the popliteal space The nerve sheath was found to be quite vascular On incising the sheath the external and internal popliteal nerves were found to be separated as high as the sciatic notch The external popliteal throughout the operative field was found to be normal in size and appearance The internal popliteal was enlarged to five or six times the normal size and presented a mottled brownish blue appearance It felt finely granular and some part seemed larger than others but no distinct nodules could be felt The nerve was incised between two of the fasciculi over one of the firmer areas and the same brownish blue appearance remained as far as the nerve was explored No bleeding was encountered in this procedure No masses could be definitely localized and it was felt that we had an irremovable tumor condition of the internal popliteal nerve The wound was closed and the child returned to the ward

Postoperative consideration It was felt that because of the existing deformity the pain and the lack of importance of the internal popliteal in the thigh an amputation above the knee would be desirable together with the removal of the internal popliteal as high as the sciatic notch and this was advised

Operation October 1922 The old wound throughout the length of the thigh was excised and the internal popliteal was divided at the highest possible level the proximal end tied and injected with 95 per cent alcohol The end of the incision were then carried as a racquet around the knee and the bone was divided above the epiphyseal cartilage and treated aperiosteally On the external portion of the racquet a bluish pongy mass was encountered which bled freely The external popliteal could not be found at the level of the amputation and because of the child's condition a prolonged search for the same was not instituted The distal end of the internal popliteal nerve was removed from its sheath and the wound closed

Subsequent course There was again a superficial infection owing to the child's disturbing the dressings A plaster piton was applied At the present time he walks quite well with the apparatus Two small superficial areas in the ear have been very slow in healing The pain has disappeared from the leg and the child is much more presentable than before operation and he has been readmitted to the public schools

Pathological report Gross The external appearance of the amputated member has been sufficiently described The skin and subcutaneous fat on the mesial side of the leg were easily removed and showed nothing pathological On the lateral side of the leg the fat and the deep fascia were separated only with difficulty especially in the upper third of the leg owing to an infiltration by numerous and irregularly scattered angiomatous areas about 0 5 centimeter in diameter Just lateral to the crest of the tibia and at about the junction of the upper and middle thirds there as a pyramidal mass of angiomatous tissue which was adherent to the sheath of the tibialis anticus but which was easily separated from the subcutaneous tissues The surface of the gastrocnemius was very irregular and was mottled with angiomatous and fatty areas On section the gastrocnemius was seen to be largely replaced by fatty and fibrous tissue and has a dirty yellow color

The soleus was quite adherent to the gastrocnemius and above the presence of many angiomata was observed which extended distally into the substance of the muscle The small and posterior tibial arteries were dilated and tortuous and in the nerve and fascia removed from the so-called cysts the nerve trunks were apparently normal The sciatic nerve has already been described under the operation and its course is well shown in the figure The course of the internal popliteal nerve was marked out to the calf as a very much enlarged mass of nodules which are surrounded by a fibrous stained structure by angioma The external popliteal nerve was traced to the head of the fibula where it could be seen lying in the sparing mass of the fibularis longus and at the head of the fibula where it emerged between the belly of the gastrocnemius to the head it was about one centimeter in diameter The nerve was perfectly white about one centimeter in diameter and was more smooth and regular than normal at the proximal end it was traced into the large angioma at its main location about the head of the fibula Its sheath in the proximal portion was simply made up of angioma The nervus peroneus profundus was normal in appearance up to a point where it began to wind around the head of the fibula where it enlarged became white in color was firmer in consistency and passed through the mass of angiomatous tissue already mentioned The internal popliteal nerve divided just below the femoral division The branches to the gastrocnemius were very much enlarged and angiomatous in character The main trunk continuing as the nervus tibialis was very much enlarged and the angiomatous condition extended to the point where the nerve passed to the lateral surface of the posterior tibial muscle and to which point it apparently became normal

Microscopic sections of the gastrocnemius muscle showed only an occasional striated muscle fiber and most of the muscle fibers presented brown atrophy There was considerable replacement of the muscle tissue by fat and fibrous tissue Between the muscle fibers were numerous large channels lined by a single layer of endothelial cells some of the spaces containing red blood cells The fibrous tissue also contained numerous thin walled blood vessels and here and there were collections of round cells Sections of the nerve trunks showed large spaces lined by a single layer of endothelial cells or strong thin septa of fibrous and elastic tissue Many of these channels were in the sheaths of the nerves but the external popliteal nerve showed the sheath invaded and the nerve fibers pushed aside the blood vessels occupying practically the entire sheath and in some instances the smaller fascicles contained a number of thin walled blood vessels and in some instances a fascicle was isolated by the angioma There was no hyperplasia of the endothelial cells The whole picture was one of a new growth of thin walled blood vessels which had invaded the nerves and vessels in their paths and in this sense it was malignant

The remarkable clinical features of the present case are (1) spontaneous pain (2) tenderness in the course of the sciatic nerve and its branches (3) deformity due to muscle spasm and (4) muscular weakness due either to destruction of muscle or interference with the nerve supply or both All these symptoms pointed to nerve involvement and on them the diagnosis of neuromata was made

Pain is an unusual symptom of angiomata of the extremities It would appear to be of two kinds (1) the pain of congestion (2) spontaneous pain Both kinds were found in this case Spontaneous pain bespeaks nerve irritation Monod (21) in 1879 described a case of angioma douloureux in which there was spontaneous pain and local tenderness in a mass above the right olecranon which appeared subsequent to trauma He attributes priority in the description of this condition to Schuh (32) and also states that Trélat (33) described similar conditions Tubby (38) under the same name described the case of a woman who had a series of angiomata appearing in both arms and finally in the leg In the latter at least spontaneous pain was one of the presenting symptoms From their pathological description and discussions it would seem that nerve involvement was incidental a few nerve fibers running through the tumor or its capsule Fabian (11) in a rather confused and brief report mentions a cavernous angioma of the coracobrachialis muscle which suddenly became troublesome the arm being heavy with radiating pains throughout its entire length followed by weakness and complete disability At operation the musculocutaneous nerve was found to run through the middle of the growth He had made a diagnosis of neurofibromata on the basis of a small firm sensitive lump One can only wish that a more complete symptomatic and

[illegible] nerve involvement [illegible]

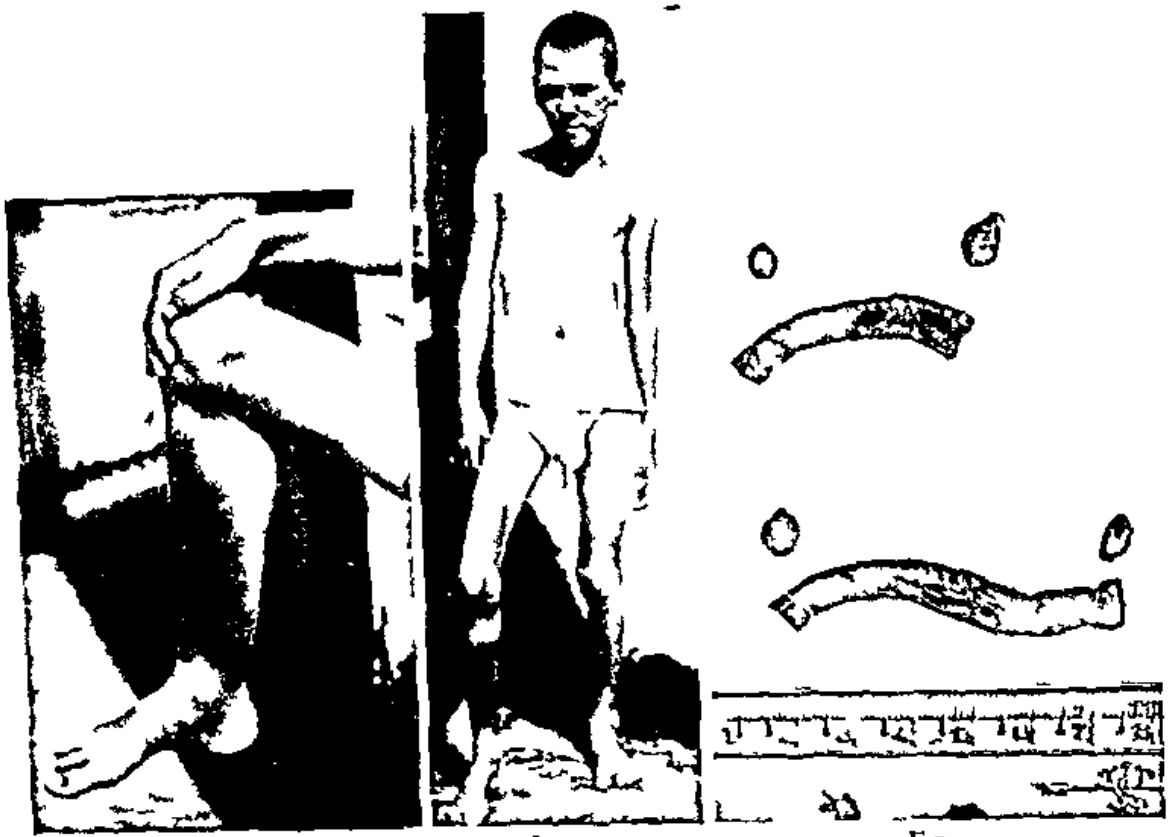


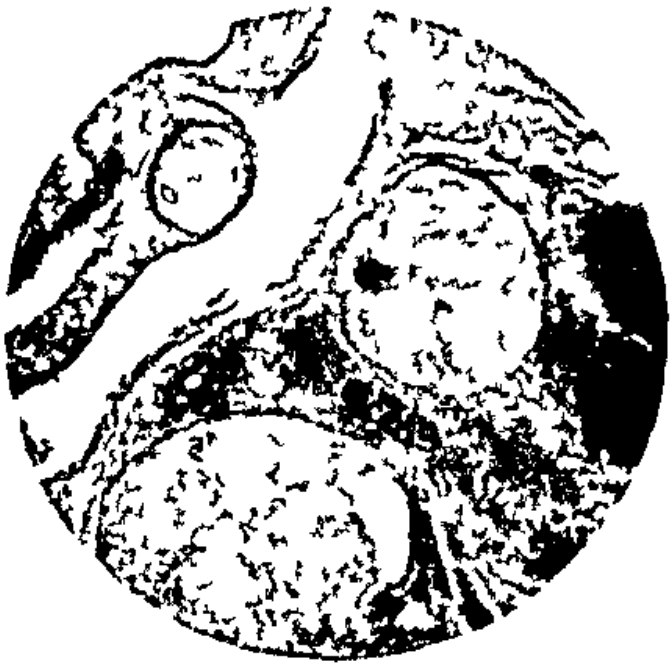
Fig 1 Fig 2 Fig 3

Fig 1 Shows position taken by patient assumed when standing also how some of the lumps in the leg Fig Shows position taken by child as he could take off in making a step Also illustrates some of the lumps in the leg and partly the fullness of the knee The right leg also hilts depersonalgmentation of the skin Fig 3 Specimen of internal popliteal nerve and oss sections showing removed from respondingly enlarged segment In the lower left hand section note the perifascicular arrangement of the angioma The split in the lower sections represents the site of the plotary operation The right hand segment illustrates very well the manner in which the angioma was seen to dilate along the nerve and in very similar thickmanner in which it also appeared in the diminished thickness The oss sections show the irregular and extensive manner in which the nerve was involved

pathological report of this case could be found Sommer (34) gives a somewhat ambiguous description of a patient who had an angioma of the posterior tibial nerve A girl aged 4 developed a soft spongy tumor behind the left internal malleolus About one year later the tumor became exceedingly painful especially on pressure Shortly after the onset of the pain the tumor was operated upon and was shown to be an angioma of the posterior tibial nerve Pathological examination revealed the fact that the larger nerve bundles were distributed over the surface of the tumor Each of these bundles was subdivided into fasciculi and in the periphery of these fasciculi were found capillaries containing from three to five corpuscles and he suggests that an individual fasciculus seems to offer the picture of an early stage of the entire nerve He also abstracts a report of a case of Sato (31) in which the patient exhibits the same characteristics of delayed pain and a broken up nerve A brief report of this case appears in a subsequent paragraph of this paper

Here then are at least four instances of angiomata of the larger peripheral nerves in two of which we are certain that the fasciculi had been invaded by the new growth of blood vessels In all of them the tumor existed for a longer or shorter period as a painless object then suddenly it became severely painful No other reports of angiomata of the peripheral nerve were found in the literature and while it is unwise to draw absolute conclusions from so small a number it would appear that the sudden onset of pain radiating from a hitherto painless tumor in the soft parts of the body wall or extremities should suggest a hæman

The same term used throughout his description exactly illustrates of the nerves so that we cannot be sure of the exact point of invasion by the tumor



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roma invading a peripheral nerve as one of the possibilities

Tenderness of course is common in many conditions but its appearance along the course of major nerves is very suggestive of an irritated condition of that nerve

A case of Cruveilhier (6) is the only one that has been found in which there was a contracture or pastile rigidity in the part affected by the tumor There is no history save that she was hemiplegic and whether or not the contracture was due to the cerebral or peripheral lesion cannot be said Muscle pain is sometimes significant of a bone or joint lesion but this was definitely ruled out in the patient whose history is here presented

Muscular weakness is frequently mentioned by various writers It may be due to a destruction of muscle as the *gastrocnemius* of the present case or it may be due to a destructive lesion of the nerve which is thought to account for the general weakness which exists below the knee as the from the gastrocnemius Sato (31) describes a patient male age 64 years who for fourteen years had observed a hard painless tumor on the medial side of his arm Eight months before Sato observed him he began to have lancinating pains radiating into the forearm which gradually extended in the course of three months so that the thumb index and middle fingers were affected At the same time the tumor became painful on pressure the pain passing toward the arm and the arm became very weak and there was some paresthesia and hyperesthesia in the region supplied by the median and ulnar (?) nerves The median nerve was found to run through the growth which broke the nerve up badly The cavernous spaces contained thrombi and phleboliths A more exact pathological report is not given by Sommer who abstracted Satos report The angioma reported by Sommer was at such a low level that only the intrinsic muscles of the foot could possibly be affected and any slight weakness of these would be very difficult to determine

The question naturally arises as to whether preoperatively a more exact diagnosis could have been made in this instance Monod (22) calls attention to a deeper pigmentation of the skin over a subcutaneous angioma which was present in the case that is here presented Again the small bluish out pouching over the tubular head might have been suggestive and might also the exploratory diagnosis of varix by another operator The latter aid was not found preoperatively

One wonders if the shortening of the leg and smallness of the foot are results of nervous or vascular disturbances one or both Abhurst's (1) and Hichenstein's (11) patients had shortening while Carters (14) had an increased length of the foot What caused the differences in systolic and pulse pressure and what is their relation ship to the diagnosis? Without other cases for comparison no generalizations can be made as to the diagnostic value of these points

Hemangiomata of the spinal cord or its envelopes are exceedingly rare Cobb (4) in a most thorough review of the literature found but 7 and added 1 more A better summary of the reported cases can not be found than the first paragraph of Cobbs discussion of his case

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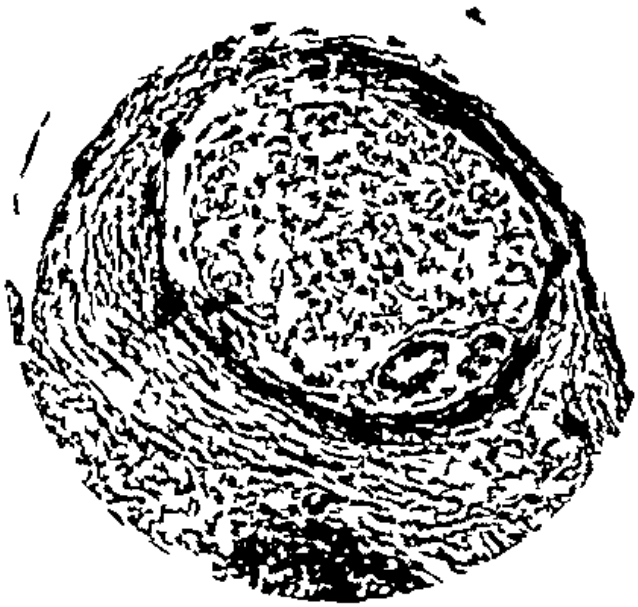


Fig 5 Section of internal popliteal nerve showing newly formed blood vessels and evidence of early death



Fig 6 Section of internal popliteal nerve showing newly formed vessels with thin nerve sheath

The series of seven cases though small permits of a comparison which brings out some points of interest The onset is usually slow the paralysis not reaching its maximum for days or even months In two instances weakness of the feet was the first symptom preceding paralysis of the leg by 2 weeks and by 6 months in another weakness of the right hand preceded the paralysis by 2 days In three of the cases pain came on suddenly but was not followed by paralysis for 5 days in one weeks in another and 5 months in the third A history of recurrent attacks after partial recovery appeared twice while in four of the cases a single attack seemed sufficient to cause a permanent paralysis Four of the histories note an onset with flaccid paralysis described as weakness the spastic symptoms not coming on for a considerable time—months 6 months and 14 years in three of the cases while in the fourth the patient died in the flaccid state In short the symptomatology appears to be that of hæmorrhage into the spinal cord or canal generally recurrent if the patient survives the first paralysis Death in two of the cases was due to respiratory failure in two to decubitus and in two others to operation while one has no clinical history and the other patient is alive

Pathologically it is striking that in all of the cases the tumor involved the pia in two the dura was also involved and in two the cord substance was invaded The tendency seems therefore to be toward a low position

One of the most interesting features of the case here reported is the occurrence of nævi on the skin in the same metamere as the angioma of the cord that is to say the membranes of the spinal cord in the vicinity of the tumor are supplied by the same nerve roots as the skin on which the nævi were found In none of the other cases was a similar observation made unless the lipomata and deep angiomata in Berenbruch's case may be so considered but nævi may have been present and escaped notice or may have been noticed and not thought worthy of record

From the orthopedic standpoint in Cobb's case it is interesting to note that the presumptive diagnosis on admission was anterior poliomyelitis In his case the angioma was evidently of the racemose type This was also found in two other cases and cavernous angioma was noted in one case In the remaining instances the exact character of the tumor was not mentioned

Among the tumors of the brain we find some 21 recorded instances of racemose angioma of

the brain all of which have been reviewed by Deist (9) who finds no clear cut way of separating them from other tumors giving rise to jacksonian attacks

Cushing (8) has called attention to a very interesting angiomatous condition of the brain which is worthy of note The symptom complex which he describes is this a child who has a nævus involving some portion of the skin supplied by the fifth cranial nerve associated with hypertrophy of the deeper tissues of the affected area develops hemiplegic symptoms and epileptiform attacks without apparent cause At times there is increased irritability and decreased mentality Besides these features which would ordinarily be noted by the parents Cushing finds in all his cases and in 3 other cases which have been recorded that the eye of the affected side shows a wider palpebral fissure and a bluish sclera which gives the eye a china doll appearance There is no change in the fundus of the affected eye In the two cases where the dura was examined one at operation and one at autopsy there was found a very definite thickening and increased vascularity of the dura over the motor and adjacent areas He ligated the external carotid in one case with excellent results

PROGNOSIS

As to prognosis it would seem that the majority of vascular tumors remain symptomless throughout life Occasionally the hæmangioma becomes definitely malignant metastasizing to all parts of the body and there is a definite and considerable number which exhibit growth by extension the limit of whose advance no man can estimate Attention has been drawn to a few of these Considering their usual insignificance at birth the uncertainty of their development the possible magnitude of their growth the uncertainty of arresting their progress and the severity of the developed disability it would seem wise to formulate a more exact procedure for their disposition All angiomata it may be fairly said are potentially benignly malignant usually sparing life but always marring and sometimes disabling their victims It appears that the prognosis under treatment is dependent somewhat upon the age at which treatment is begun the younger the child the more favorable the prognosis (30)

TREATMENT

A multitude of methods have been instituted in the treatment of this condition

As to the superficial type it would seem that the port wine stain are very resistant to treatment (30) while the elevated growths yield satisfactory results with freezing or radium (30 24) and if used before extension has developed the treatment may be considered in a measure prophylactic When we consider the case here recorded we wonder if deep radiation in infancy might not have averted the amputation If ever this condition confronts us again at a time when it has not become so advanced we will certainly advise these measures

The cavernous type has received in the main two forms of treatment coagulation and operation The former is based on the belief that by one of several means the blood within the tumor may be coagulated and will eventually organize causing scar tissue The coagulants used are boiling water astringent chemicals such as ferric chloride and electricity Such procedures are open to serious objections Pean in the admirable discussion already referred to warns his students that injections of these types have been followed by severe local inflammation gangrene multiple emboli and death He applied a tourniquet around the arm and then injected the vessels He at once cut down on them and excised the mass his object being to preserve the form of the vascular mass so that its parts could be more easily recognized In the operative field many procedures have been used subcutaneous ligation open ligation and excision The first two are certainly only temporary expedients the pathology of the condition not being taken into account While the ligation may arrest the current it fails to stop neoplastic tendencies It is imperative therefore that if a cure is to be effected excision of the whole mass should be undertaken In the cases where a single muscle or group of muscles is involved it would be wise to consider the orthopedic

significance and possibilities prior to the original operation Certainly in the lower extremities where the mass is causing severe symptoms or is greatly incapacitating an amputation might well be considered We have no guides as to postoperative treatment but judging from experience in other fields we might employ some form of radiation to destroy any remaining elements

In the racemose type ligation but preferably excision would be the method of choice Cushing in the case reported by Cobb did not consider either of these methods feasible probably because of the extent of the growth or the condition of the patient

CONCLUSIONS

1 Angioma of the most trivial sort should be regarded much more seriously than at present

2 All angiomata should be regarded as potentially malignant by extension

3 In an obscure condition the presence of superficial nævi in either the same metamere or on other parts of the body would be suggestive of an angiomatous cause

4 A hitherto painless tumor of the soft parts of the body wall or extremities which suddenly becomes painful should suggest an angioma invading the peripheral nerves as one of the possibilities

5 Destruction of an angioma by some rational method should be undertaken as a prophylactic measure as soon as recognized

6 Angiomata either directly or indirectly may give rise to conditions which suggest or require orthopedic treatment

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LYMPHANGIOMA OF THE FALLOPIAN TUBE

By L. W. STRONG, M.D., New York

THE occurrence of a lymphangioma in the fallopian tube is sufficiently rare to justify a report of cases which have been found in the routine examination of tissues at the Woman's Hospital, New York.

The literature on the subject contains but 5 cases, 4 of which are referred to in Veit's *Handbuch der Gynaekologie*, vol. v, p. 190, and also in Liepmann's *Handbuch*, vol. ii, p. 177. The fifth case is one of Dr. O. Frankl's described by Leighton in the *American Journal of Obstetrics and Gynecology* for 1912, and also referred to in Liepmann's *Handbuch*.

Since the distinction between a lymphangioma and a local dilatation or lymphangiectasis may be regarded as rather indefinite, it is important to note that these reported cases are all described as true tumors by Frankl and by Fromme and Heynemann, who write the article for Veit, *Handbuch*.

Dilatations of pre-existing channels do not take the form of circumscribed nodular tumor, and they occur only where there is a physical cause, namely, the accumulation of secretions or foreign matter requiring removal. No such static conditions were present in the accompanying cases; the tubes were in all other respects normal.

A brief description of the 2 additional cases is given here.

CASE 1. Path. No. 18104. A married woman of 48 was admitted to the service of Dr. Ward for an abdominal tumor. At operation a large symmetrical tumor of the ovary was found, and a complete hysterectomy was done.

The pathological report gives a uterus of normal size, with a normal mucosa. One ovary is replaced by an irregular solid tumor of dense fibrous tissue extending into the ligamentum ovarii almost to the tubal corner. About 1 centimeter from the isthmic extremity of the tube, and embedded in its wall, is a firm nodular tumor of about 5 millimeters diameter. Microscopical examination of uterus and ovarian tumor shows dense fibrosis of the myometrium and a fibroma of the ovary. The nodule in the tube shows obliteration of the tubal lumen with replacement by fibrous connective tissue and round cell infiltration. The nodule itself consists of a mass of lymph spaces lined by a regular endothelium which here and there is undergoing proliferation. The nodule is surrounded by normal musculature.

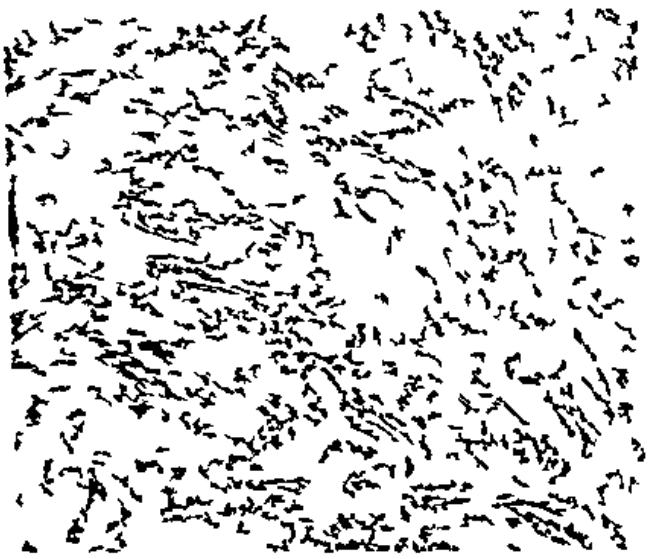
CASE 2. Path. No. 24096. A married woman of 2[illegible] was admitted to the service of Dr. Crad[illegible] for pelvic pain and hæmorrhage. At operation a retroverted uterus was found giving a purulent discharge from the os. A complete hysterectomy was done.

The pathological examination showed a large boggy uterus with a stenosed internal os. The ovaries were somewhat enlarged and showed numerous cysts of the follicles. The tubes were of normal size; moderately convoluted and a well defined hard nodule was felt in the wall of one. A section of this nodule was taken. Microscopical examination of this nodule showed a reticulum of connective tissue with large spaces of rather uniform size lined by a simple flat endothelium showing no tendency to proliferate. The nodule is about 0.5 centimeter in diameter. The margins merge without definite boundaries into the connective tissue of the tubal wall.

The fact that in both cases a localized nodule was observed macroscopically and removed for microscopic examination makes them entirely comparable with the 5 cases already reported. It would appear that these 2 were as distinctly tumors as are the ones recognized by Frankl and others, although they were perhaps smaller than some. Leighton speaks of Frankl's case as the smallest.

The descriptions of all the 7 cases including the present so closely resemble each other that the inference may be drawn that this is a characteristic, even though very rare, neoplasm of the fallopian tube. Its small size and the fact that it has always been an accidental finding make it plausible that its rarity is more apparent than real. There is nothing in the clinical history of these cases which has any apparent bearing on the tumors.

However, the 2 of the present report are of value because they were not associated with myomata, as were all the previous ones. This controverts the inference made by Leighton that there is a relationship between the lymphangiomata and myomata. Both my cases were associated with inflammatory conditions, although in both instances the tubes were of normal size, with patent fimbriæ, extremities



F 18 4 C se Ph tom c o ph f lymphan g om of the t b



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The fact that myomata or adnexal disease was present in all cases indicates nothing more than a condition for which an operation was undertaken without which the lymphangioma would have remained undiscovered These tumors have occurred both in the isthmic and ampullary portion of the tube They have been of small size and oval in shape It has been suggested by Kermauner that they were potentially malignant on account of the proliferation of endothelium and he has therefore related them to endotheliomata There is certainly no appearance of malignancy in the present cases and they are to be regarded in the same light as lymphangiomata of the skin and elsewhere A certain amount of proliferation of endothelium however is characteristic of all lymphangiomata

PERMANENT URINARY RETENTION FOLLOWING PROSTATIC ABSCESS

By R I CUMMING M D Detroit Michigan

ANOTHER etiological factor advanced as directly relative to suppuration in *the prostate gland and giving* rise to persistent urinary retention is of sufficient importance to merit in our opinion a detailed account as a clinical occurrence

A brief enumeration of the common causes of retention in the male will reveal as exogenous factors stricture traumatic injury and foreign bodies as endogenous factors calculus median bar hyperplasic prostate tumor the myelitides and possible vesical diverticuli The congenital malformations of the *urethra occupy a position of increasing im*portance as indicated by Young No doubt *many such malformations have gone unrecog*nized in the past Sudden and complete retention is rarely seen unless related to injury foreign body stone or congenital atresia of the urethra The case which we shall present falls neither in the province of congenital or acquired pathology in so far as we have outlined the common and anticipated types clinically observed

The continuous use of catheters whether surgically clean or direct from the pocket of a patient wielded by surgeon or patient is fraught with dangers both of injury and infection Since the foundation of urology the pernicious practice of oft repeated catheterization has presented a problem the immediate comfort for both patient and physician calls for the catheter and the path of least resistance lead to vicious complications When skilled specialists cannot avoid urethral chills temporary bacteræmias which are sometimes fatal following urethral instrumentation how much more impossible it is for the *victim himself* It was with these facts in mind that the writer undertook the care and treatment of the case outlined below He freely admits the prolonged period necessary for recovery not only as evidence of the difficult problem presented but also as a means of emphasizing the value of exact diagnosis and painstaking operative *and postoperative* effort The case history developed as events transpired will evolve a number of questions for discussion and comment

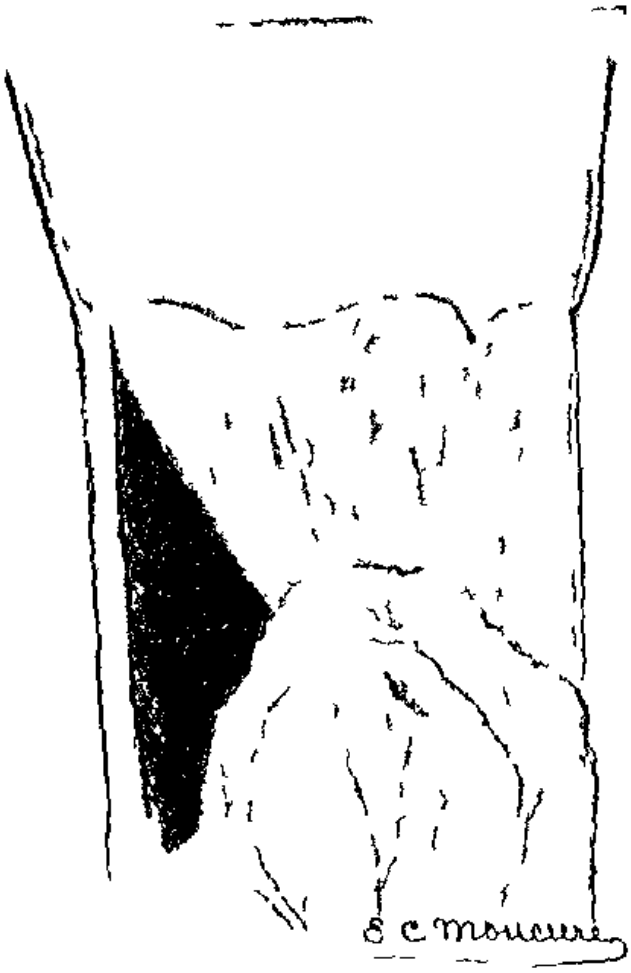
CASE HISTORY

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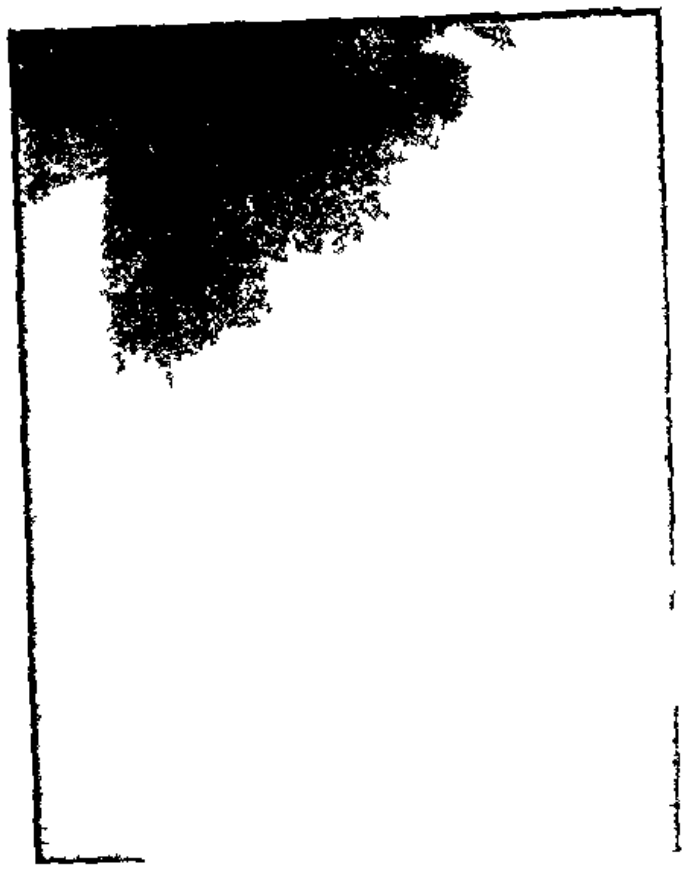


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TREATMENT

A study of the roentgenogram will enable the reader to visualize our phenomenon It should be stated that in one or two instances in which the bladder was *filled* a wide dilatation of the right ureter was demonstrated—hydro ureter from back *pressure* The posterior urethra itself was also considered as definitely dilated Two suprapubic one perineal and three Young punch operations were performed On August 20 1920 a suprapubic cystotomy enabled direct exploration of the extravesical pathology I quote my original note Exploration by finger revealed the condition found cysto*copically* except that the internal urethral meatus was extremely contracted and sclerotic to the degree that the tip of one s little finger could not enter the urethra After dilatation with the finger in the urethra the lateral wall loss was verified and

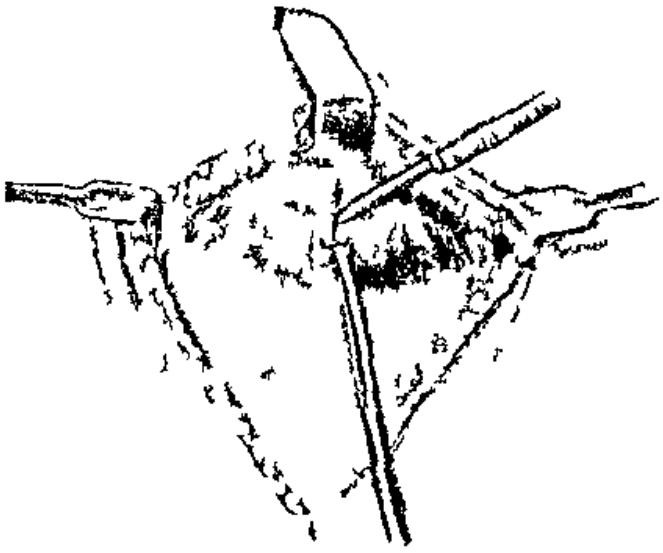


Fig 3 Schematic drawing of penibladder Two hæmostatic sutures may be seen lateral to the internal urethral meatus These a deep incision was made extending through mucosa and fascia and the sclerotic wall of the cavity external to the bladder

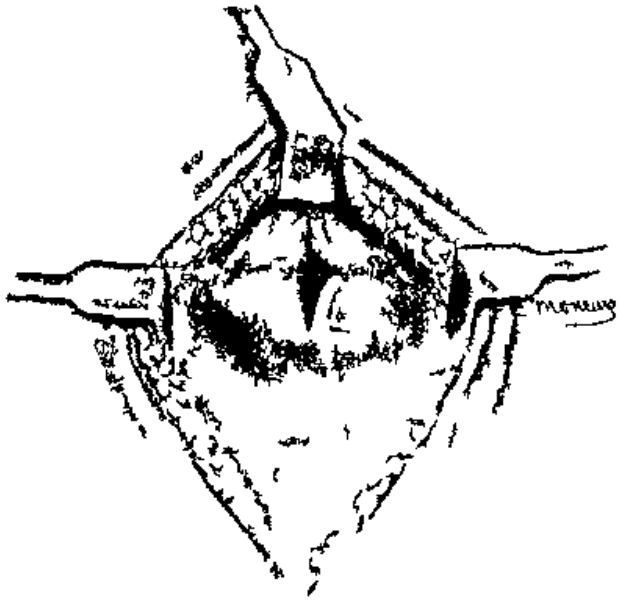


Fig 4 Drawing showing condition after sphincter completed

the cavity external to the bladder found to extend posterior to the bladder and urethra its interior extent could not be determined The operation then consisted of deep splitting of the sphincter in the mid line after inserting lateral mattress sutures for hæmostasis The lateral opening into the urethra was enlarged above in an attempt to make the bladder and false cavity one The bladder was then closed with drainage

The result from this operation was poor an infection of the bladder and wound postponed healing so long that sclerosis and scar contraction reproduced the original condition except that for a time the patient was able to void 2 to 4 ounces of urine

After three trials considerable tissue having been removed from the sphincter area the Young punch method was discarded as inadequate meanwhile although the patient's general condition was excellent catheters were constantly in use The second suprapubic cystotomy was forced as an abscess developed in the incision scar When the scar was opened a large sinus was disclosed leading down into the pelvis to the right of the bladder where the peritoneal wall constituted the superior and anterior border of a large abscess Incidental to a timid exploration the swollen inflamed appendix poked itself into sight This was delivered the peritoneum was opened freely the omentum was hurriedly spread over the intestinal mass and the whole area protected by tamponade After the appendectomy and the placing of drains intraperitoneally the bladder was re opened for examination with findings similar to those above described The sphincter was more lax and the urethral opening nearer to the bladder cavity No further reconstruction was attempted Complete abdominal healing occurred in 5 weeks the retention still persisting

A third cystotomy was performed April 20 1921 this time by the perineal route With a generous urethrotomy incision it was possible to palpate the false cavity outside the bladder this seemed to be flattened out in its long axis and the internal sphincter presented a definite sclerotic ring between bladder and urethra Simple tears served to widen the opening of the urethral cavity and the internal sphincter was widely dilated with two parallel Goodell dilators An incision down to the rectum in the mid line served further to open the bladder and to connect the bladder cavity with that outside (A block of tissue excised in the area of the incision described failed to show microscopically protatic tissue or muscle it was simply scar) The false cavity was scarified and packed with iodo

form gauze a large rectal tube wrapped with several layers of iodoform gauze was inserted into the bladder for drainage

Since this latter operation a catheter has never been necessary the patient s recovery and progress was satisfactory and healing consumed only an average period A perfect result was not obtained as a slight incontinence persists On coughing or jolting or occasionally while walking a few drops of urine escape

In a communication this month 2 years after the final operation the patient is well and reports no retention but a slight occasional leakage but no kidney disturbance

CONCLUSIONS

In retrospective consideration of this laborious and imperfect cure of an obstinate retention one is tempted to say that the perineal operation should have been the original manuever it was seriously considered and discarded principally because of the poor bladder access one might hope to obtain and in fear of a graver degree of incontinence than actually developed As to the incontinence would it be wise to try to improve upon it by a plastic tightening of the urethra in the region of the cut off muscle? Apparently the bladder neck will not interfere again and should the incontinence increase or the perineal scar reopen a local resection and closure might give an even more satisfactory end result

An acute massive prostatic abscess giving rise to retention is of no particular significance to have this common chain of events followed by a complete and permanent retention with apparent destruction of the prostate and possibly of the seminal vesicles which in this instance were never palpated is indeed a calamity Whether the cavity described and presented photographically was in fact a result of prostatic destruction is frankly conjectural No prostate or vesicles were found on examination o operative exploration and the patient was otherwise anatomically sound save for a slight hypospadias Sexually he was normally active prior to and including the period of retention and has remained so

The mechanism of the retention I explained by considering the urine filled extravesical cavity as a curtain calling into play the cut

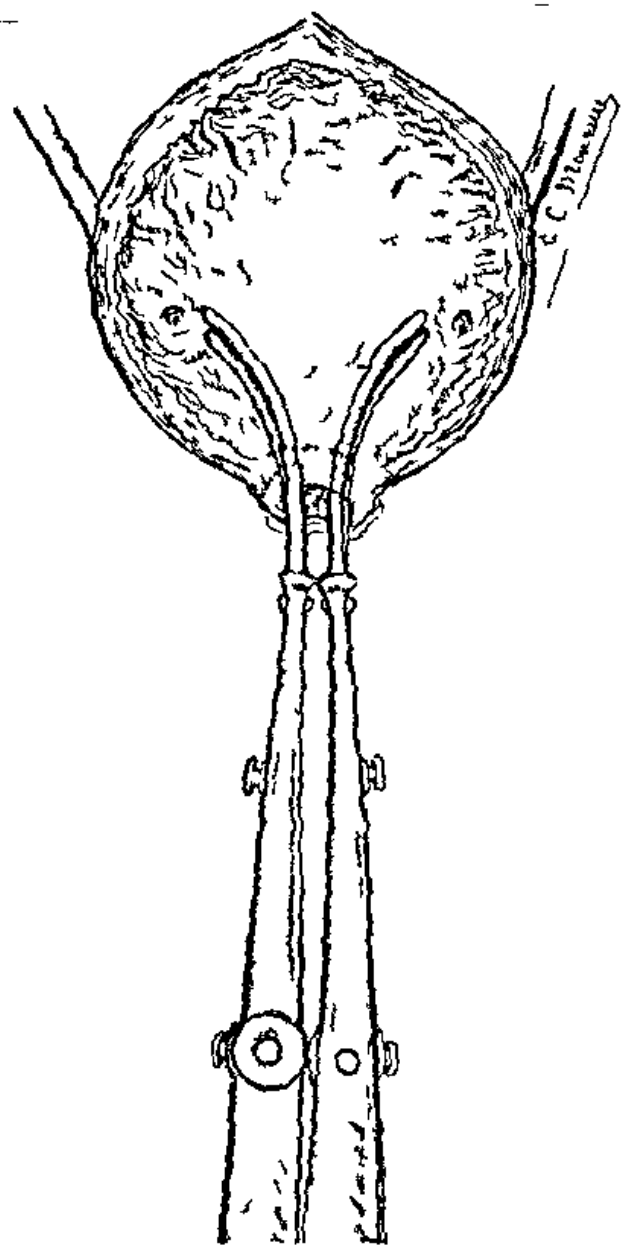


Fig 5 Illustrating method for dilatation of interstitial sphincter To tool illuminating dilators placed parallel to one another after resection through perineal wound

off muscle since this urethral diverticulum had a generous opening and successfully *inhibiting* all detrusor activity of the bladder itself The more pressure exerted *from the* bladder and the accessory muscles *the more* widely and tightly did this watery curtain prevent the passage of urine The sclerosis resulted

At *the beginning* of this paper I referred to congenital malformations of the posterior urethra *particularly* the so called verumontanal veil three types of which were described by Dr Young We have seen a case of the rarest

of these types within a year with permanent relief of the retention by a plastic operation. It seems to me impossible to consider the case above described as congenitally anomalous, although inherent weakness of the urethral wall and an imperfect or ill destroyed prostate may have been concomitant with the hypospadia. Whether the prostatic infection was gonorrheal or not is futile to contemplate.

SUMMARY

The case presented indicated that rare and grossly destructive prostatic infections may produce a complete and permanent retention of urine directly resulting from a false cavity beyond control of the normal expulsory apparatus. Multiple operative proceedings resulted in a permanent, safe and workable relief of the retention.

SUBCUTANEOUS EMPHYSEMA CAUSED BY AN ANAEROBIC MICROCOCCUS (STAPHYLOCOCCUS AEROGENES SCHOTTMUELLER) COMPLICATING DIABETES MELLITUS

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AND

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A CONSIDERABLE variety of complications often modify the clinical course of diabetes. Gangrene is one of the most common complications of this disease. Infection, especially by the staphylococcus aureus, are by no means unusual. Suppurative lesions caused by bacillus coli in diabetic patients have occasionally been associated with gas formation (8).

Gas formation in tissue, in general, has usually developed from infected penetrating wounds. Although a variety of anaerobic organisms has from time to time been isolated from gangrenous processes associated with gas formation, still in the vast majority of instances one of the well known types of anaerobic bacilli has been the infecting organism. The occasional occurrence of anaerobic cocci in such processes has attracted very little interest. These anaerobic cocci, when present, have with few exceptions been associated with other organisms.

Anaerobic cocci capable of gas formation in either lesion or culture have been isolated from the oral cavity (9, 10, 11), from otitic infections (12), from pulmonary gangrene (4), from tuberculous cavities (14), from suppurative appendicitis (16), from the female genital tract (5), from suppurative bartholinitis (15), from puerperal infection (1, 3, 6, 13), and from suppurative periurethritis ( ).

These anaerobic gas forming cocci represent several types which are distinctive morphologically and culturally. They have in several instances occurred in pure cultures from lesions and have been considered as the etiological factors.

History of the case as reported. White male, 58 years old, an engineer on a steamer, was admitted to the U. S. Veterans' Hospital No. ..., December 4, 19.., with the diagnosis of ... gangrene ... diabetes ... On admission the patient complained of pain in the foot, pain in his right ..., and general weakness.

It ... ment ... th ... moth ... from ... bet ... diabetes.

Pa... Diabetes ... unrecognized ... illness stated ... before ... which ... little ... well ... red ... m ... after ... pain ... right ... which ... in ... weeks ... ges.

The ... the patient ... in ... fair ... small toe of the left foot was gangrenous, with the line of demarcation well formed.



Fig. 1.—X-ray plate showing multiple air containing pockets in axilla and upper part of arm.



Fig. 2.—Photomicrograph showing grouping of cocci.

The right shoulder was very slightly reddened and very tender to pressure. Movements were painful although the scope of motion was not restricted.

Laboratory findings on admission were as follows: Urine showed a trace of albumin, a few hyaline casts and many pus cells; volume for 24 hours was 3 liters; specific gravity 1.040; sugar was positive for acetone and diacetic acid. The blood Wassermann was negative. White blood count of 9,400 with 85 per cent polymorphonuclear cells. Red blood count of 3,400,000.

It was concluded that the patient did not have syphilis and the other associated clinical manifestations not mentioned here were no doubt diabetic.

Course of illness.—Three days after admission the patient had a slight chill, the temperature rising to 102 degrees F., which was soon followed by an increase in the severity of the pain in the right shoulder. Swelling and redness increased about the shoulder. No fluctuation could be elicited at this time. Movement of the shoulder was markedly restricted on account of pain. At this time the lungs were normal and a blood culture was negative. The gangrene of the little toe had become worse and had extended to the adjacent toe. On the following day two small bleb, 0.5 centimeters and 1.5 centimeters in diameter respectively, appeared over the trapezius muscle. A crepitation characteristic of air in tissue was felt posterior to the outer third of the clavicle. The accompanying subcutaneous emphysema showed in an X-ray plate taken at this time.

The general condition became worse. By the tenth day after admission the subcutaneous emphysema associated with fluctuation had extended in all directions including the axilla and upper part of the arm. The X-ray plate (Fig. 1) taken at this time showed multiple air containing pockets in these regions. On the eleventh day the skin sloughed over the shoulder and much foul smelling greenish yellow pus was discharged. Bubbles of gas escaped freely, especially when pressure was applied. After spontaneous rupture the process did not extend, although it continued to drain profusely. The patient became progressively worse. Death occurred on the forty-sixth day after admission.

Autopsy findings.—Gangrene involved the four outer toes of the left foot, a small area over each knee and an area over the sacrum. No crepitation was present in these locations.

There was an ulcerated area 2 centimeters in diameter situated over the right shoulder immediately posterior to the outer third of the clavicle through which much frothy, foul smelling pus was discharged. A probe could be inserted backward and downward through this opening for a distance of about 10 centimeters. On dissection multiple communicating pockets containing pus and gas were found in this region. The shoulder joint was not involved. Only the soft parts about the shoulder and upper third of the arm were involved.

The bronchi showed purulent bronchitis.

Both lungs were collapsed. Small areas of consolidation with abscess formation occurred in the lower lobe of the left lung and in the upper lobe of the right lung. Gas was not present in these abscesses.

The pancreas was small and hard. Numerous small abscesses occurred in the cortex of each kidney.

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In the bacteriological examination of cur ttings taken from the right shoulder there showed only gram positive cocci with the morphology of staphylococcus aureus Aerobic cultures on ordinary blood agar plates showed staphylococcus aureus in pure cultures Cultures in deep meat media formed much gas with fetid odor Floating from the bottom of a meat tube on enriched medium in an atmosphere of hydrogen and over pyrogallic acid mixture showed colonies of staphylococcus aureus and colonies of the anaerobic staphylococcus The anaerobic staphylococcus occurred in the lesions associated with staphylococcus aureus as was shown by examination of several specimens of pus The anaerobic staphylococcus grew more rapidly in symbiosis when cultured together the two microorganisms resembled a pure culture of staphylococcus aureus In pure culture the anaerobic coccus occurred singly in pairs and in clusters (Fig 2) The size was similar to the staphylococcus aureus It was gram positive The optimum temperature was 37 degrees C It required the strictest anaerobiosis Surface colonies were very small and lightly granular Deep colonies lenticular or 2 millimeter in diameter and were spherical

The anaerobic staphylococcus has so far failed to grow even under the strictest anaerobic conditions in ordinary media or even under digest substance (7) used for anaerobic organisms difficult to grow It grows slowly but well in deep meat media and in ordinary media enriched with whole blood serum or with ligest muscle substance

Muscle [illegible] m muscle [illegible]

In ordinary media enriched with serum covered with vaseline gas was produced and the hydrogen ion concentration fell from Ph 7.4 to Ph 6.8 When either glucose lactose or saccharose were added the hydrogen concentration never fell below Ph 6.6 even after 15 days incubation and the volume of gas was not increased over that shown by the tubes without sugar

It was not pathogenic for rabbit and guinea pig When given with staphylococcus aureus to a rabbit intravenously or subcutaneously abscesses developed which showed staphylococcus aureus only in subsequent cultures

Our organism resembles the staphylococcus aerogenes described by Schottmueller (13) which he isolated from patients with puerperal fever He found it in his cultures from the cervix from abscesses in the culdesac from purulent peritonitis from thrombophlebitis and from the blood It was isolated from 20 patients and was seen 8 times in pure culture It grew only in media enriched with blood or serum and best at 37 degrees C It was gram positive measuring 6 to 8 micron It was not pathogenic for mice guinea pigs and rabbits

DISCUSSION

The development of the subcutaneous emphysema here reported was no doubt greatly influenced by the presence of staphylococcus aureus

A relationship between gas production in the tissues and hyperglycemia could not be established In culture the volume of gas produced by the anaerobic staphylococcus was subject to moderate variation and was not appreciably more when glucose was added to the media When glucose was added to the media the hydrogen concentration fell very little more than when glucose was absent after 15 days incubation only a small part of the glucose had disappeared from the media

When the organism isolated by us was grown in pure culture in meat media the fetid odor already referred to was scarcely perceptible In media enriched with serum it was not recognizable

Gauze saturated with culture and introduced into traumatized muscle of rabbits

failed to produce evidence of infection Schottmueller was unable to reproduce disease in laboratory animals even after administering large doses

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FIBROIDS IN THE PUERPERIUM[1]

By F W Fischmann M D F A C S Chicago

OCCASIONALLY a woman with a myomatous uterus bears a child without experiencing any difficulty but fibroids often have a decided influence upon conception pregnancy labor and the puerperium Pregnancy labor and the puerperium also have an influence upon these growths and often produce changes in them

Considerable discussion has taken place as to the role fibromyomata play in the causation of sterility Most authors state that they markedly lessen the fertility of woman but Hofmeier contends that they affect conception but little if at all Olshausen undoubtedly was correct when he pointed out that the location of the tumor must be taken into consideration and that the more a fibroid encroaches upon the endometrium the more is it apt to interfere with the nidation of the fertilized ovum Thus it is found that submucous and interstitial fibroids on account of the endometrial changes and the distortion of the uterine cavity they occasion predispose to sterility while subserous growths especially when pedunculated may not affect the fertility of woman at all

Interference with the proper development of the pregnant uterus and the products of conception is frequently noted especially in sessile submucous and interstitial growths on account of the distorted cavity and the development of a diseased decidua as pointed out by Pinto and Krebs These may lead to abortion with its attendant risk from hæmorrhage and sepsis or if the pregnancy goes to term malposition of the fetus or abnormal location of the placenta often result with the well known dangers to mother and child

Alarming symptoms due to pressure upon the intestines bladder and ureters have been described by Coe

During gestation fibroids as a rule partake of the succulence the increased blood supply and the muscular hypertrophy of the uterus the extent of these changes depending upon the amount of unstriped muscle in the tumor and upon its relation to the uterine wall Thus these changes are most marked in sessile and interstitial growths especially if they be mostly myomatous The increase in size may at times be so marked that tumors which because of their small size were undetectable before pregnancy took place become readily palpable (De Lee) Necrobiosis is not uncommon during gestation due to insufficiency of the blood supply torsion of the pedicle or impaction of the neoplasm Changes in the location and the shape of fibromyomata are often noted the well known round tumors become more or less flattened and elongated

[1] Read before the Chicago Gynecological Society April 8 9 (For discussion see p 37)

Dystocia uterine atony and undue hemorrhage may be encountered during labor on account of the presence of fibroid these conditions not infrequently call for operative intervention and thus add to the hazards of mother and child

The tumors themselves suffer during labor on account of impaction twisting of their pedicle and the temporary anaemia during contractions With the onset of labor pains changes in the vascular supply of fibromyomata not infrequently occur The capsule of the tumor may be torn loose from the surrounding uterine musculature causing subcapsular hemorrhages This occurrence may initiate necrobiotic changes in the new growth or augment them if they have started during pregnancy

EFFECT OF FIBROIDS UPON THE PUERPERIUM

Bland Sutton well states that the danger from the complications of fibroids is not over with the termination of labor but that the woman's life is in jeopardy even during the puerperium Hofmeier contends that this danger has been greatly overestimated but a comprehensive study of the literature tends to support the views of the former Thus we find that fibromyomata may cause the following complications in the puerperium (1) hemorrhage (2) febrile course (3) subinvolution (4) peritonitis (5) septicæmia and pyæmia (6) inversion of uterus (7) torsion of uterus (8) embolism and (9) accidents

Hæmorrhage may occur immediately after the expulsion of the placenta especially if the latter be located directly over a fibroid The uterine musculature contracts but the placental vessels cannot Thus the neoplasm interferes with the uniform retraction of the uterus Intramural and sessile growths cause greater loss of blood often alarming hemorrhages which may result fatally as reported by Glarner and by Wertheim (2 cases) Pedunculated growths cause considerably less loss of blood immediately after delivery of the placenta because they interfere less with uterine retraction but these latter growths not infrequently cause bleeding several days postpartum (Engstrom Troell Neubner) which may keep up for several weeks often until the tumor is expelled or removed The expulsion of pedunculated submucous growths is a common occurrence this may happen during the first week post partum (Cheron's case) but may be delayed for several weeks (Schneider's case after 3 weeks Kuchenmeister after 43 days Field Barnes after 2 months) Rochrig and Lacase witnessed the explusion of a fibroid immediately after the placenta MacFarlane records a case of abortion at 4½ months and after a few days the patient passed two tangerine sized fibroid on two successive days Intraperitoneal hæmorrhage has been described by Hamilton and by Guserow as coming on 24 hours after delivery due to rupture of a superficial vein coursing over a fibroid Schmorl and I Meyer each encountered a case where fatal intraperitoneal hæmorrhage in the puerperium was due to rupture of a vein in a twisted pedicle of a fibroid tumor

On account of the malpositions of the fetus dystocia uterine atony and bleeding during labor operative treatment is often resorted to and not infrequently the placenta has to be removed manually This predisposes to infection and in some cases may be responsible for the febrile puerperium But some puerpera run a fevers h course where child and placenta are expelled spontaneously and the genital tract is not invaded from without In most of these cases the placenta lies directly over the tumor and when the former is expelled the placental site acts as an infection atrium Troell and Engstrom admit that severe puerperal sepsis may be caused by a degenerated fibroid but neither has observed such a case Neubner and Landon agree with Troell and Engstrom that in nearly all these cases the infection is introduced from without by intervention or else it reaches the fibroid from surrounding organs as the appendix the bowel or an infected tube The possibility of a hæmatogenous infection of the fibroid has been referred to by different authors The marked predisposition of fibroid to secondary infection postpartum is emphasized by Hammerschlag But W A Freund believes that symptoms of a severe toxæmia may have their origin in a degenerated fibromyoma without evidences of in

fection Such cases are mentioned by Troell Engstrom and others

A fibromyoma in the uterine wall as a rule hinders or retards the involutionary changes of the puerperium in the same manner that it interferes with the normal retraction of the uterus after the expulsion of the placenta The uterus remains large and boggy until the neoplasm is expelled sooner or later If expelled soon the tumor may have suffered but little change of its structure but if not extruded until several weeks later then various stages of degeneration may be present As a result of these changes the necrotic mass is often expelled piecemeal or small pieces of necrotic tissue may be washed away with the extremely malodorous lochia

Gans reports a case of a large intramural fibroid which burst into the peritoneal cavity on the third day postpartum and death resulted from peritonitis due to the necrotic material Von Franque also reports a case of a fibroid free in the peritoneal cavity having lost its connection with the uterine wall which became secondarily infected from the bowel and caused peritonitis

Simpson (quoted by Engstrom) saw an infected pedunculated subserous fibroid which was adherent to the anterior abdominal wall and when involution took place the growth was torn loose and peritonitis resulted Again Glarner and others report cases in which death from peritonitis followed the removal of infected subserous fibroids

Illustrative of the difficulty in diagnosis as well as the possibility of degenerated fibromyomata causing symptoms of severe sepsis is the case operated upon by MacFarlane The preoperative diagnosis of acute appendicitis was changed when a necrotic intramural fibroid was discovered A panhysterectomy was performed which was followed by death the next day Wiener (quoted by Neubner) describes a case of an intramural tumor the size of a man s head The patient s temperature was steadily rising and she had repeated chills An abdominal hysterectomy was followed by death from pyæmia on the ninth day postpartum

The puerperal expulsion of a fibroid may be the cause of an inverted uterus Prochov

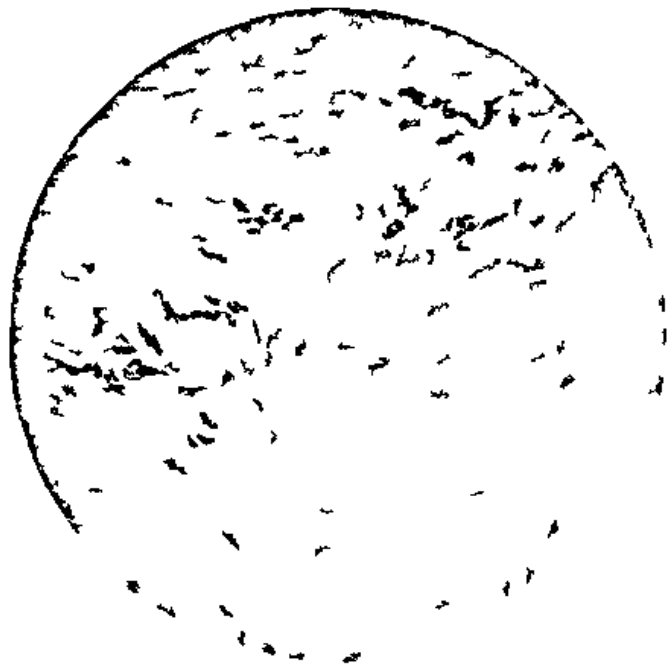


Fig 1 Low power magnification (100 × diameter) of necrotic tumor showing bundles of muscle fiber without nuclei and beginning calcification

nik was called to see a case of inversion which occurred on the tenth day postpartum Spencer observed a postabortive and a postpartum inversion of the uterus The last author also describes a submucous fibroid which caused severe bleeding 11 days after delivery While performing the operation of morcellement an inversion of the uterus occurred affording Spencer a splendid opportunity to remove the tumor completely At the end of the operation he replaced the inverted organ Winter observed a somewhat similar case Traction upon a presenting fibroid caused inversion and as soon as the traction was released after the removal of the new growth the uterus receded Mackenrodt makes mention of a 39 year old primipara who bled for 3 weeks postpartum On the twenty second day he prescribed ergot and shortly thereafter a degenerated fibroid presented into the vagina The latter was found to be adherent by a broad pedicle to the fundus of an inverted uterus He thinks the inversion occurred before the ergot was given but it was not discovered

Holowko reports a case of torsion of the uterus due to a sessile subserous fibroid of the fundus which happened when the patient left her bed on the tenth day postpartum At



Fig. 2 Medium power magnification (15 × diameter) of area with marked edematous infiltration



Fig. 3 High power magnification (380 × diameter) of area showing fat droplets in the necrotic muscle fibres.

operation a 360 degree rotation at cervicocorporal junction of the uterus was found and the fibroid showed multiple hæmorrhages and cystic degeneration Van Herff mentions a case of torsion of the pedicle of a fibroid in the puerperium

Bossler and Weindler speak of pulmonary embolism as a complication of degeneration of fibroids postpartum Acetonuria due to fatty degeneration of fibroid in puerperæ has been found by Troell Keith has encountered a case of ileus due to compression by a large degenerated fibroid during the lying in period In cases in which a submucous fibroid blocks the cervical canal and prevents the escape of lochia lochiometra is mentioned by Neubner and De Lee as causing intoxication symptoms Krieger reports a case of rupture of a non pregnant uterus due to a fibroid Hitschmann has found atrophy of the endometrium over a fibroid and invasion of the uterine musculature and blood vessels by syncytium Meyer Ruegg states that aseptic necrosis may extend to the wall of the uterus and may cause perforation In view of these facts and observations it is singular that not a single case of rupture of the uterus during the period of the puerperium has been recorded

EFFECT OF THE PUERPERIUM ON FIBROIDS

In most instances a fibroid that has increased in size during pregnancy on account of the increased vascularity will suffer the same changes during the puerperium that the uterus does As a rule the retrogressive changes in the former keep pace with those in the latter These changes are described under the term of involution and consist both in the uterus and the new growth of fatty degeneration and absorption of muscle cell contents of thrombosis of newly formed vessels and compression of the larger blood vessels Landau has shown that if the retrogressive changes in the fibroid extend beyond the normal hyaline changes and at times myxomatous changes may be observed He has also found that if a thrombosis of the nutrient vessels of a fibroid occurs hæmorrhagic and anæmic infarcts result and often gangrene Troell states that diminution in size of a fibroid is a common observation especially if the tumor contain many muscle fibers and be sessile or interstitial At times the shrinkage may be so marked that the tumor cannot be readily palpated and sometimes is thought to have disappeared Scanzoni and Spencer each report such a case As a rule the diminution in size post

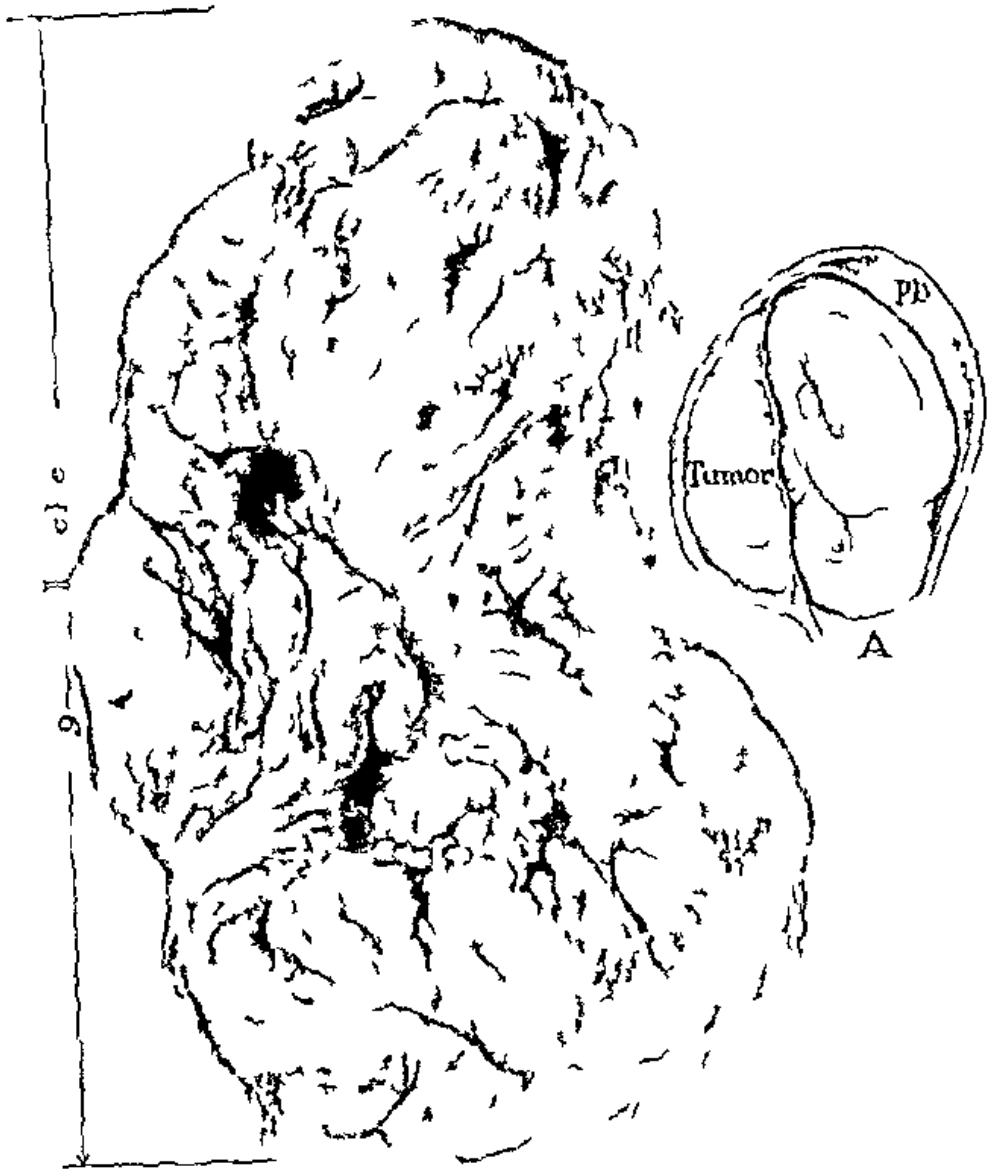


Fig. 4.—Drawing of specimen shown in figure 1 in author's case.

partum is commensurate with the increase during gestation.

Complete disappearance of fibromyomata has been mentioned by Gusserow, Kosmak and Doran, but Kelly, De Lee and Lockyer have never observed such a case and question this occurrence. Olshausen however states that such a possibility must be admitted. Lott records a case of spontaneous cure of a large fibroid due to suppuration.

Again fibromyomata may increase in size during the puerperium because of progressive fatty or myomatous changes or as Munro Kerr has observed on two occasions the tumors may continue the increase in growth that started during gestation. Hammerschlag after an extensive histological study of the changes occurring in fibromyomata came to the conclusion that the changes that occur postpartum do not differ from those in the non-pregnant state and he takes exception to the theory of the trauma of labor but a recitation of the reported cases would convince any one that while the same changes occur in both states they are decidedly more marked and more frequent during the puerperium. Furthermore these tumors are more prone to secondary infection postpartum probably on account of (1) the retrogressive changes initiated during pregnancy, (2) the puerperal changes in the mucosa and (3) the oft called for operative

intervention There has been considerable discussion as to the time when necrobiotic changes begin Von Franque holds that they frequently originate during gestation because of compression of the thin walled nutrient vessels but Gusserow thinks it scarcely probable because of the good blood supply at this time The latter contends that the lessened blood supply during the puerperium is the cause of these changes and that they may be ushered in by the trauma of labor when the capsule of the tumor is torn loose from the surrounding myometrium when subcapsular hæmorrhages and even thrombosis of the nutrient blood vessels may take place That necrosis of a fibroid may have its beginning during pregnancy is illustrated by the cases of Von Opitz and Waldo Von Opitz peeled out a completely necrotic fibroid from the uterine wall while attempting to remove the placenta manually Waldo operated upon a case on the third day postpartum and removed a gangrenous fibromyoma

In support of the possibility of the occurrence of an aseptic necrosis can be cited the cases of Benthin and Spurney Benthin found a total necrosis of a large fibroid after an abortion and aerobic and anaerobic cultures from the neoplasm were sterile As no other etiological factor was discovered he believes the degeneration was due to the trauma of labor Spurney s patient after a perfectly normal delivery was seized suddenly with severe abdominal pain on the tenth day postpartum but had no fever and only a slight leucocytosis At operation red degeneration of a large intramural fibroid was found It was demonstrated to be due to a thrombosis

Hammerschlag describes four stages of necrobiosis of fibromyomata (1) simple necrosis without demarcation (2) necrosis with softening (3) necrosis with localized suppuration and (4) gangrene of neoplasm He states that (1) and (2) are not infrequently seen as is illustrated by the cases cited above Many such cases appear in the literature He states that (3) and (4) ar due to microbic invasion The infection may be introduced from without when the uterine cavity is entered or it may be brought to the tumor by way of the blood tream or reach it from an infected surrounding organ

Suppuration of fibroids is usually associated with more or less gangrene and has been described to occur more often in submucosal growths than in the intramural variety An interesting case of total disappearance of a fibroid due to suppuration was observed by V Lott While exploring the uterine cavity manually he found a tumor the size of a child Three weeks postpartum the patient was up and about the temperature gradually rose and there was a foul smelling vaginal discharge The tumor steadily diminished in size until it could be felt no more and when a laparotomy for ovarian cyst was done a few years later the uterus showed no vestige of a tumor At no time was any tissue passed so that the disappearance of the fibromyoma was in all probability due to suppuration gangrene and enzymatic action

That suppuration may cause enucleation of an interstitial fibrou tumor is illustrated by Bland Sutton s and by the author s case Bland Sutton was called to see a case of dystocia due to a large tumor In order to determine whether it was a solid or cystic growth he put in a trocar but found no fluid After a septic course of 5 weeks a sloughing fibroid escaped from the uterus and 8 weeks after delivery the patient was well

The products of suppuration of a fibroid may escape into the free peritoneal cavity (Gans case) through the anterior abdominal wall (Neugebauer s case) through a fistulous tract between tumor and the vagina (Lefaur s case) or accumulate in the cul-de sac of Douglas (Herman s case) Jakobs observed pus from a suppurating fibroid escaping from the umbilicus during the latter months of pregnancy

Submucous and interstitial myofibromata may be expelled from the uterine cavity In pedunculated submucosal growths it is not an uncommon occurrence as reported by Neubner Troell Engstrom and many others The sooner after labor they are expelled the less marked are the retrogressive changes in them In the majority of the case hæmorrhage and a profuse foul smelling lochia is present and not infrequently constitutional

symptoms of sepsis Because of the necrotic changes in the fibroid and uterine contractions the tumor gradually loses its connection with the uterus and is expelled by the contractions Bland Sutton records a gangrenous submucous fibroid which protruded from the uterus on the thirteenth day post partum Without operative interference the patient died of sepsis

Calcification of a fibroid during the puerperium is referred to by Trolli No other writers make mention of it Areas of lime salts deposits of various sizes were noted between and about the muscle fibres in my case The possibility of sarcomatous degeneration in the puerperal state is furnished by the cases reported by Scheurer and by Spencer

TREATMENT

A word or two as to the treatment of these new growths in the puerpera may not be amiss If the woman is allowed to go to term and a fibroid is present cæsarean section with immediate myomectomy or hysteromyomectomy undoubtedly is the safest procedure (Kosmak) If this is not the operation of choice Neubner advises watchful expectancy and warns against operative delivery from below and manual removal of the placenta on account of the danger of infection

If after delivery the patient shows evidence of post hæmorrhage or increase in the size of the fibroid conservation is the safest practice although Bland Sutton and Kosmak advise an immediate hysterectomy in cases in which a fibroid has been pushed up out of the pelvis during pregnancy or labor and if a few days postpartum any of the foregoing symptoms appear

As to the operative course curettage marcellation myomectomy and vaginal supravaginal and total hysterectomy have been recommended But these patients do not stand surgical treatment very well there is danger of perforation of the uterus during curettage danger of contamination of the peritoneum and the danger of shock Thus Bland Sutton mentions a death from shock during an attempt to remove a submucous fibroid in a puerpera Marx witnessed gangrene of the bladder after marcellation

REPORT OF AUTHOR'S CASE OF A SUBMUCOSAL FIBROID

Mrs X 40 years old a primipara had her last menstrual period December 16 1922 She was first seen June 23 1923 Examination at this time revealed a rather large well nourished woman weighing 212 pounds The abdomen was markedly enlarged and symmetrical The fundus of the uterus reached 3 fingerbreadths above the umbilicus and extended well into both iliac fossæ On palpation two longitudinal fetal ovoids could be made out the consistency seemed uniform Only one set of heart tones was heard As twin pregnancy was suspected an X ray examination was suggested but was refused She went through the remainder of her pregnancy complaining of a feeling of distention and heaviness On September 6 the membranes ruptured and September 8 at 8 00 a m pains began and at 8 00 p m he entered the hospital Rectal examination showed the cervix fully dilated right occipito anterior The pains were irregular but fairly strong September 9 at 4 00 a m the head was on the perineum but made no progress from then on Low forceps were applied and a male child weighing 8 pounds 8¾ ounces was delivered at 6 30 a m The fundus of the uterus remained above the umbilicus and another fetal ovoid seemed to occupy the right side So the hand was introduced into the uterine cavity and the placenta peeled itself off from the left lateral wall near the fundus and soon I could feel asymmetrical retraction of the organ as the right half did not take part It was occupied by a semi solid mass of unequal consistency which did not protrude any more into the cavity than it did towards the peritoneal surface it was more or less flattened Without any further manipulation the patient was returned to her bed in good condition

Subsequent course An hour and a half after delivery the patient was seized with a severe chill *lasting twenty minutes* another one occurred an hour later lasting thirty five minutes She experienced severe chilly sensations in the afternoon and evening September 10 she had two chills and September 11 two more After the first chill her temperature rose to 105 8 and ranged from 101 to 105 for the next four weeks The uterus did not change in size shape or consistency during this period There was a profuse and exceedingly foul smelling lochia The patient was seen in consultation with Dr Barrett and the following treatment was agreed upon

Fowler's position was used to facilitate drainage Fluid extract of ergot drops 25 three times a day was given to aid involution and possibly in the expulsion of the fibroid *Iodine douches were given* three times a day The patient's condition remained unchanged until October 4 when she again experienced labor pains every fifteen minutes Suddenly there was a gush of thin malodorous pus *about 1/2 pints* The pains continued and the following day upon vaginal examination the cervix

was found somewhat dilated with a mass presenting which had the feel of a macerated fetal head October 6 under gas anæsthesia an attempt was made to extract this mass which was finally accomplished by the application of the Tarnier forceps Another gush of pus followed its delivery There was no bleeding and the uterus contracted readily pituitrin and aseptic ergot were given hypodermically The patient s temperature dropped immediately the discharge lessened and ten days later he was discharged She has been in perfect health since then but she has not menstruated to date

Laboratory Tests The urine has been negative except for a trace of albumen and an occasional granular cast during the febrile course The leucocytes on admission were 8 000 after the first chill 4 000 and thereafter from 12 000 to 16 000 until the mass was removed hen the count fell to 6 000 Differential counts showed from 0 to 85 per cent polymorphonuclears Hæmoglobin on admission was 85 per cent but fell to 60 per cent during the febrile state Erythrocytes on admission were 4 500 000 and then gradually fell to 3 000 000 Two blood cultures proved sterile Smears from the lochia and pus at different times showed many colon bacilli and staphylococci On one occasion a pure culture of colon bacilli was cultivated from the urine

Examination of specimen by D Jaffé The macroscopic examination shows an irregular and flattened mass but 25 centimeters long 10 to 5 centimeters wide and about 0 centimeters thick The surface is uneven and grayish green in color There are several tags consisting of soft pliable tissue attached to the surface The mass is riddled with holes of various sizes from which escapes thick yellowish green intensely foul smelling pus After the pus has been washed out a spongy formation remains which is made up of a homogeneous fibrous material The consistency is quite firm and on the cut surface the color is grayish white with less distinct whitish striations running in different directions There are a few darker areas the consistency of which is less than that of the surrounding tissue

Under the microscope the structure of the tissue is still recognizable Bundles of elongated homogenous fibers interlacing in various directions and staining deeply red with eosin are separated by a paler stained homogeneous tissue In the bundles there are either no nuclei at all or here and there faintly stained fragments are visible In several places the course of these bundles seems to be interrupted by irregular granules which take an intensely blue hæmotoxylin stain sometimes these masses are less distinct and appear pale blue A Sudan III stain reveals a large amount of fat droplets with in and around these bundles And the bluish stained granules are found the larger accumulations of fat droplets Surrounding the holes described in the macroscopic examination are found numerous well stained polymorphonuclear leucocytes invading the tissue In these places the bundles of fibres have disappeared and a mesh work of connective tissue between the cells can be recognized Smears of the pus from the specimen showed bacillus coli and staphylococci

Diagnosis Necrotic fibromyoma with fatty degeneration and beginning calcification and localized suppuration

This patient apparently had an intramural fibroid which took on growth during pregnancy because of the increased blood supply As gestation progressed it became flattened and elongated and during the last weeks necrobiotic changes set in With the retraction of the uterus the tumor was compressed and some of the toxins from the necrotic process were forced into the circulation and a chill occurred At the time of each chill there was more absorption Whether the further changes that is the suppuration and sloughing were due to infection introduced at the time of the application of the forceps or the intra uterine exploration is a question but due aseptic care was exercised in all manipulations However the mucosa over the fibroid was traumatized and micro organisms entered in some way and produced a subcapsular suppuration which is the etiological factor in the enucleation of this fibromyoma from the uterine wall The subcapsular suppuration was an infection of a subcapsular hæmatoma which undoubtedly occurred during labor The contractions tore the capsule loose from the surrounding uterine musculature and bleeding followed Finally the uterine contractions aided in the partial expulsion of the suppurating fibroid The endometrium was involved in the suppurative process and this suppuration was responsible for the destruction of the endometrium and hence the cessation of menstruation

It is the opinion of Dr Jaffe after carefully examining the microscopic sections that the retrogressive changes are not of more than 4 or 5 weeks duration as there are many strands of muscle tissue in fairly good condition many fragments of nuclei and only a moderate degree of fatty and hyaline changes with little calcification So that these changes may have been initiated during the last days of her pregnancy

As far as I could find there is no other case in the literature in which a definitely palpated

interstitial fibroid was spontaneously separated from its uterine wall attachments in the puerperium and subsequently partially expelled

CONCLUSIONS

1 Fibroid tumors in the puerperium may cause serious complications frequently a febrile course

2 Fibroid tumors themselves may suffer changes during gestation and labor and these may progress and even be augmented by secondary infection during the puerperium

3 When a woman with a fibromyomatous uterus becomes pregnant and goes to term cæsarean section with an immediate myomectomy or hysteromyomectomy is the operation of choice

4 When the myoma is not discovered until during labor or in the puerperium conservatism should be practiced as long as possible

I wish to acknowledge my indebtedness and express my appreciation to Dr R H Jaffé Director of the Uhlenhuth Research Laboratories of Grant Hospital of Chicago for valuable assistance in the examination of the specimen

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DEPARTMENT OF TECHNIQUE

LOCAL ANÆSTHESIA OF THE ABDOMINAL SYMPATHETIC SYSTEM[1]

By ROBERT EMMETT FARR M D F A C S Minneapolis Minnesota

THE writer feels that the use of local anæsthesia in abdominal surgery has not been as extensive as its advantages seem to warrant The tendency has been to confine its use to the types of cases in which general anæsthesia is contra indicated During recent years and more particularly in this country surgeons have employed it more extensively Some of the reasons for the curtailment of its use and the widespread opinion that it is unsatisfactory in most types of abdominal surgery will be discussed in the following pages In addition an effort will be made to demonstrate method which if applied consistently offer an opportunity for a broader application of local anæsthesia in abdominal surgery

The advantages of the method are legion but in this message these will be referred to only incidentally as the writer will occupy the time at his disposal mainly with a discussion of the following important considerations

1 A review of the literature of the past 4 years made in an effort to ascertain the attitude of those well versed in the use of local anæsthesia toward the facility with which the method may be used in abdominal surgery

2 An effort to analyze the reasons for the apparent lack of enthusiasm on the part of some of these writers

3 A summary of the alleged objections to the use of local anæsthesia in abdominal surgery based upon a review of the literature the discussions before medical associations and upon conversations with and observations of large numbers of clinicians

4 An outline of a more comprehensive terminology of local anæsthesia

5 A discussion of the general factors influencing the application of local anæsthesia to abdominal surgery

6 A description of the technique used by the writer in establishing anæsthesia of the *thoracic* and *sympathetic nerves* by which the use of local anæsthesia in abdominal surgery may be greatly simplified and facilitated

QUOTATIONS FROM THE LITERATURE

The statements of such men as Haertel Sherwood Dunn Allen Labat and his student Meeker of the Mayo Clinic Harri Finsterer and Braun may I think be used as a basis for taking stock of the present status of the subject

Sherwood Dunn whose monograph appeared in 1920 shows a preference for intraspinal anæsthesia for major intra abdominal operations upon the liver stomach intestines and pelvic organs He prefers regional anæsthesia in cholecystostomy for appendectomy when the acute attack has subsided and provided the appendix and cæcum are free from adhesions

For the performance of major upper abdominal operations paravertebral anæsthesia injected in such a manner as to reach the abdominal sympathetics is necessary and he says that in order to anæsthetize for hysterectomy fibroids of salpingitis one must inject 1 pairs (of nerves) on each side six lower intercostals three lumbar and three sacral He further states that in these conditions he prefers lumbosacral anæsthesia

Thus this surgeon would limit the use of simple local anæsthesia to cholecystostomy and to the removal of the interval appendix which is free from adhesions excepting when applying paravertebral anæsthesia by a technique which insures anæsthesia of the sympathetic system Most authors agree that this method is wellnigh impossible to carry out and even those favoring *simple*

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paravertebral anæsthesia admit its many drawbacks He prefers intraspinal anæsthesia and his book presents little encouragement to surgeons to use local anæsthesia in this field

In the last edition of Allen which appeared in 1920 he states Any operation with any certainty of success by purely local means must be limited to those parts which are in contact with the abdominal wall or are readily accessible and can be operated on without undue manipulation or traction In the presence of acute *inflammation extensive adhesions* or when the diagnosis is *at all in doubt* local anæsthesia is not indicated He further states All simple operations such as gastrotomy colostomy appendectomy and gall bladder drainage are quite satisfactorily performed when the parts are fairly accessible and not matted down by inflammation or adhesions to parietal peritoneum or surrounding organs consequently only such operations should be undertaken when it is *known beforehand* that favorable conditions exist [1]

He recommend abdominal exploration when using local anæsthesia by the method of insinuating the hand into the abdominal cavity and says Local anæsthesia is not the method for routine work within the abdomen If on exploring through a mid line incision an appendix or diseased gall bladder is encountered separate incisions should be made over these parts rather than attempt to displace them toward the mid line

He excludes as a general rule all very stout individuals and those with tense rigid abdominal walls for as soon as the abdomen is open the contents bulge out and as any extensive packing back or the use of deep retractors excites pain the difficulties are at once increased by the straining which the e procedures bring on He states further

In thin subjects with relaxed abdominal walls operations of considerable magnitude may *at times* be performed In such subjects it is usually possible to slip two fingers or a long narrow retractor down and expose the retroperitoneal tissues for infiltration

The introduction of local anæsthesia in the neighborhood of the solar plexus is *always* difficult in *favorable subjects* only possible in the hands of those who have had much experience with local anæsthesia methods within the cavity He takes the position that removal of the appendix in the presence of inflammation or extensive adhesions is *never* suitable for local methods alone Extensive gall bladder disease with stones in the cystic or common duct he also considers unsuitable for the use of local anæsthesia While stating that cæsarean sections can be quite readily performed under local anæsthesia he feels that this method should be used only when general anæsthesia is contra indicated [2]

Allen s dictum that local anæsthesia should not be used when there is a possibility of adhesions being encountered or in the presence of fat or rigidity removes from the field a considerable proportion of cases in which we believe local anæsthesia can be used with success Contrary to his opinion we have almost never been compelled to make a separate incision and rigidity disappears under perfect local anæsthesia Bulging out of the abdominal contents is unusual His reference to the use of deep retractors and extensive packing and his advice that the inflamed appendix or gall bladder preclude the possibility of using local anæsthesia are almost entirely at variance with our experience in abdominal surgery The fact that for more than 10 years we have used local anæsthesia in over 90 per cent of our gall bladder cases regardless of the type and in over 97 per cent of our appendix cases regardless of the stage of the disease or the age of the patient should be sufficient evidence why we cannot agree with this author

Labat in his book published in 1922 in discussing splanchnic anæsthesia by the anterior route states The method of Braun and Pauchet can be used with advantage only after a mid line incision and in the absence of such pathological conditions of the stomach liver and gall bladder as would permit of free exposure of the lesser omentum A distended stomach stands too much in the way so does a stomach adherent to the pancreas or the liver *et fortiori* to both organs

[1] Italics mine.

[2] Italics min

This author uses almost the exact words of Allen when he states These procedures are besides very difficult in certain cases In *stout individuals with tense rigid abdominal* walls as soon as the abdomen is opened the contents bulge out and even the packing back is *not an easy task In thin relaxed* patients it is usually possible when gentleness is used to slip two fingers in opening the way for the needle to the *solar plexus or to* the retroperitoneal tissue in its vicinity care being exercised in the neighborhood of the large vessels Even under the best conditions the technique is only possible in the hands of those who have acquired much experience with local methods within the abdomen

He states that splanchnic anæsthesia by the posterior route of Kappis Naegli or his own should be given preference no matter what technique is employed

With regard to paravertebral block he states it does not widen the scope of operations capable of being performed by means of the field block procedure and he considers that the possibility of danger of paravertebral block *militates against its use for laparotomy* only and preference is given to the field block procedure

When recommending local anæsthesia for cæsarean section and cholecystostomy he prefers the use of the direct infiltration method to that of regional anesthesia or field block He now prefers the procedure which he calls field block or infiltration block as used by the writer to paravertebral as it is much more easily accomplished and requires no especially long and delicate training as does paravertebral block This author admits that paravertebral block is difficult long and tedious tiring to the patient and that it is not quite as safe as other procedures considering the enormous dose of novocain required to produce anesthesia He makes the further significant statement that intraspinal block *is easier quicker and safer* [1]

Another reason given by Labat for using intraspinal in preference to paravertebral anæsthesia is because when using it the condition which the writer many years ago designated as negative intra abdominal pressure cannot be obtained His advice regarding the making of abdominal explorations duplicates that of Allen when he says *' The abdominal organs may be explored provided the incision is long enough to allow the hand to steal into the abdominal cavity without force The result of his experience in* this regard becomes manifest when he states that some patients require just enough ether *or gas to make them lose consciousness during* this stage of the operation

He refers repeatedly to the tendency of the *bowels to bulge out* as soon as the abdomen is opened In dealing with the appendix he recommend that in cases in which the cæcum cannot be brought to the *level of the surgical wound* it is preferable to give first stage inhalation narcosis He says

The *injection* of the *meso-appendix* does *not amount* to *much* in abolishing painful sensation but recommends such injection *as soon as the appendix is brought out between the lips of the wound* [2]

With regard to ovarian cysts his experience is reflected when he says Its pedicle is *infiltrated before ligation or a few whiffs* of ether or gas administered before the stage of the operation

He states The induction of anæsthesia for abdominal operations is *very difficult* and requires *long practice* He reaches the conclusion that *intra spinal* anæsthesia is the *anæsthesia of choice in fat patients* [3]

Regarding toxicity he says The use of one half pint of 1 per cent solution is absolutely dangerous The same author while objecting to infiltration anæsthesia states If the solution is distributed to the structures of the body to be cut through or excised *direct infiltration is extremely safe* because the greater part of the injected fluid escapes when *the incision is made* [4] *He considers* this one of the most potent reason why direct infiltration should be used whenever possible

He advises a delay of 5 minutes or more after the induction of the anesthesia before beginning the operation even when field block is used

It is interesting to note that this author's attitude has been completely reversed in re

[1] It has man

[2] Italics mine

gard to paravertebral anæsthesia since his arrival in this country 3 years ago

The contrast between his writings and those of Sherwood Dunn (both of whom were associated with Pauchet) in relation to paravertebral anæsthesia and their agreement that intraspinal is safer and in fact the anæsthesia of choice for intra abdominal work are most significant Labat's statement that it is necessary to bring the cæcum out of the abdomen and that anæsthesia of the meso appendix is ineffectual does not tally with our experience

Our viewpoint differs radically from his We have in hundreds of cases reproduced the patient's original appendiceal colic by making pressure or traction on the meso appendix We have invariably been able to abolish this colic by a thorough infiltration of this tissue This experience has led us to the routine procedure of blocking the meso appendix or even the mesocæcum *before* attempting its elevation and before placing clamps In no instance do we consider it an absolute essential to raise the cæcum or appendix to the level of the surgical wound in order to deal with it Here *surgical strategy* effectually offsets the exigency which Labat considers sufficient demand for inhalation anæsthesia

The reason given that local anæsthesia be excluded in large herniæ so obviously ignores the value of a condition of negative intra abdominal pressure and coincides so well with the statement appearing frequently in his book that upon opening the abdomen the contents bulge out that it would seem that more propaganda along this line is indicated

He condemns the use of anterior sympathetic anæsthesia so unqualifiedly in favor of the posterior route of Kappis as to make abdominal surgery appear possible only in the hands of the most expert In the mind of this author whose monograph has been published so recently the apparent difficulty and impracticability of carrying out this procedure is so manifest that it is not surprising to find the opinion prevalent among his followers that a degree of skill is required the acquisition of which is discouraging

The advice to administer gas in order to ligate the pedicle of an ordinary ovarian cyst does not coincide with our experience nor can we agree that the induction of anæsthesia for abdominal operations is very difficult and requires long practice

It is encouraging to note that he has abandoned paravertebral anæsthesia for infiltration of the abdominal wall and that he admits that direct infiltration is the method of choice in some instances and the safest in all

Meeker and Bonar in SURGERY GYNECOLOGY AND OBSTETRICS in December 1923 practically the latest contribution upon this subject make a number of statements which are so significant that it seems well worth while to quote them They state that parametric infiltration carried out through the vagina has been very little employed except by Ruge stressing the possibility of perforating the rectum bladder or coils of intestine and the dissemination of septic foci with the needle In regard to abdominal pelvic operations their viewpoint is well illustrated by the following quotation In operating within the abdominal cavity only a limited number of gynecologic operations are feasible and only then under very favorable conditions such as *thin relaxed abdominal walls* no *acute inflammation* or *pelvic adhesions* but *free mobility of the parts* [1] Quoting further no packing of the abdominal cavity can be performed no breaking up of adhesions nor grasping of the uterus with volsellum or other toothed instruments unless the points at which they are applied have first been infiltrated For the more extensive abdominopelvic operations however particularly *hysterectomy general narcosis* is necessary for the intra abdominal work [1] The addition of transsacral nerve block and even the supplementing of this procedure by lumbar paravertebral nerve block does not solve the problem They further state that infiltration sufficient for abdominal hysterectomy has been accomplished in only a few very favorable cases by men of the widest experience in the handling of local anæsthesia problems the thorough and comprehensive work of Farr constituting the only notable exception to this statement They conclude

[1] Ibid

their discussion of this phase of the problem as follows For most surgeons of wide experience local anæsthesia by whatever method induced does not create an operative condition compatible with the employment of the appropriate surgical methods which are indicated in most abdominopelvic operations

Quite obviously the statements of Meeker and Bonar may be said to reflect the present attitude of the Mayo Clinic in relation to the scope of local anæsthesia (December 22 1923)

With regard to the danger of the parametric injection which should of course not be used in the presence of sepsis or suspected malignant disease the literature shows nothing deprecatory to local anæsthesia

Regarding the opportunity offered by local anæsthesia for the performance of pelvic operations the writer might quote the statement of Dr L L McArthur to whom he recently had the pleasure of demonstrating the use of the method in this field This surgeon stated that in an experience of 40 years he had not observed such an excellent opportunity for the performance of an abdominopelvic operation under any form of anæsthesia as that presented Incidentally it might be stated that the patient shown was fat extremely nervous and had previously been subjected to two local anæsthesia operations without success If the statements of Meeker and Bonar may be said to reflect the facts even approximately the use of local anæsthesia in this region must certainly be limited By way of contrast the writer's experience over a period of 16 years with parametric infiltration without an accident of any kind and his completion of over 90 per cent of abdominopelvic operations during the past 10 years under the local anæsthesia method make the conclusions of these authors seem more or less premature

In contrast to their opinions those of Harris Finsterer Braun and Haertel are most significant In addition the opinions of hundreds of surgeons with whose work the writer is familiar go to show that abdominopelvic operations of almost every variety may be performed painlessly under this method

It is gratifying to note the position taken by Harris an excellent surgeon and a man of wide experience in the use of local anæsthesia who in *Oxford Surgery* 1923 says Many of the organs are not sensitive to ordinary trauma so that much operative work may be done without pain by simply blocking the abdominal wall The abdomen may be opened and its contents thoroughly explored without pain One may do a great deal of work in the abdomen under local anæsthesia in the most satisfactory manner'

Finsterer in his book *Anæsthesia in Abdominal Surgery* 1923 states that the chief dangers of every major operation are the effects of general anæsthesia or its results He says of paravertebral anæsthesia it is very unpleasant to the patient on account of the 20 needle punctures and the relatively large doses of novocain are not harmless I have never considered paravertebral anæsthesia the method of choice in gastric resection It is more dangerous than the other methods of conductive anæsthesia it will never become the method of choice It has been more or less abandoned

Finsterer claims that gastric dilatation is of rare occurrence after the use of local anæsthesia and that the absence of intestinal atony greatly reduces the liability to post operative peritonitis

In relation to the anterior splanchnic anæsthesia of Braun he states By introduction of the needle the patient occasionally experiences pain which demands a slight amount of ether

Braun's experience seems in accord with that of Finsterer and yet this author allots only 10 pages of his recent book to the surgery of the abdomen exclusive of that of the abdominal wall Labat Kappis and others believe that the posterior splanchnic is superior to Braun's method of obtaining intraperitoneal anæsthesia

In personal visits to large numbers of clinics the writer found that the limitations placed upon local anæsthesia by the writers quoted above are accepted to a great extent by a majority of surgeons Likewise teaching institutions and surgeons of the highest rank seem as a rule to be less impressed with the local anæsthesia method than are surgeons who are not so widely known

It is obvious that this belief would not be so widespread if a method could be developed of obtaining anæsthesia within the abdomen which even approximated that possible in the abdominal wall It is the writer's conviction that the method about to be described will make it possible for the average surgeon to perform a considerable percentage of his abdominal operations under this *régime*

SUMMARY OF THE ALLEGED OBJECTIONS TO THE USE OF LOCAL ANÆSTHESIA IN ABDOMINAL SURGERY

An attempt to summarize the alleged objections to the use of local anesthesia in abdominal surgery has resulted in a grouping together of the following factors which singly or combined are considered reasons for its avoidance

Rigid abdominal walls excessive fat the time required and the irksomeness of introducing the solution failure to obtain a negative intra abdominal pressure the presence of visceroparietal and visceroviscoral adhesions the difficulty of making abdominal explorations the impossibility of returning viscera from hernial sacs into the abdominal cavity the danger of introducing the required amount of solution acute inflammation the difficulty of gaining exposure interference with wound healing psychic incompatability of the patient the special tax placed upon the surgeon's endurance the difficulty of learning the method and teaching it to others the presence of pathology which is not readily accessible and a host of other factors are *mentioned*

While these objections are *more or less* tenable in some instances the writer is convinced that there are means at hand at the present time to meet and overcome almost all of them provided the *local anæsthetic technique* and *surgical technique* applied are according to the plan outlined below

In the writer's opinion the following factors offer the most difficulty

1 Lack of co operation on the part of the patient This is met only occasionally and becomes infrequent as the patients learn that these operations may be painlessly and successfully performed

2 The presence of acute inflammatory processes Such patients may offer great difficulties but a considerable percentage of them may be treated with success after a certain degree of skill and experience is developed

3 Distention of the intestines In many instances the second and third factors are combined Careful packing and retraction combined with evisceration and enterostomy when indicated will often meet the requirements As a rule the more difficult the case the more urgent is the demand for local anæsthesia

4 Deep or posterior adhesions These may preclude the possibility of completing an operation However a good exposure sharp dissection careful packing and the employment of intraperitoneal anæsthesia will meet the indications in a fair percentage of cases

5 Large tumors with short pedicles (fibroids or carcinomata) Occasionally a large solid tumor may so obstruct the operative field that the necessary *exposure* cannot be obtained and in such an event if it can be anticipated posterior splanchnic (Kappis) transsacral (Pauchet) or parametrical anæsthesia may be used as a *preliminary* to laparotomy

6 Persistent nausea and vomiting *Once* in a while a patient will become nauseated during an operation *even though* sharp traction is not employed *In our hands* this is a more common indication for general anæsthesia than is pain In case fresh air and cold cloths applied to the forehead do not overcome this condition psychic ether seems to meet the indications best If necessary this may of course be carried on to complete narcosis

A DEFINITION OF TERMS

Before proceeding further it may be well to *call attention* to a certain confusion of terms which is evident upon visiting clinics *and medical* conventions and observing and *listening* to surgeons The method of Crile for example is often referred to as local anæsthesia while quite obviously it is 'mixed *anæsthesia* Also many operations begun under local anæsthesia and completed under general anæsthesia are reported and

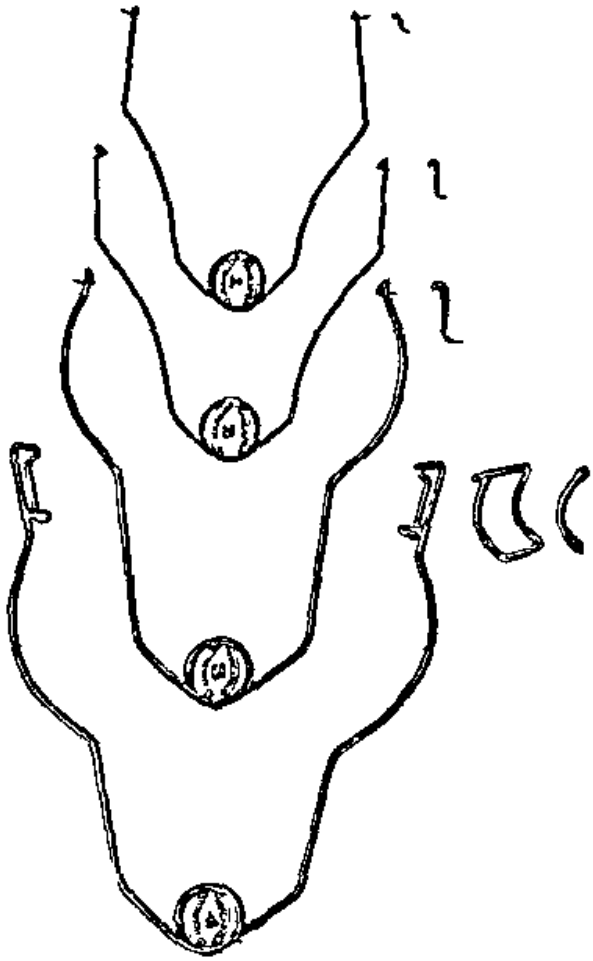


Fig. Automatic spring retractors

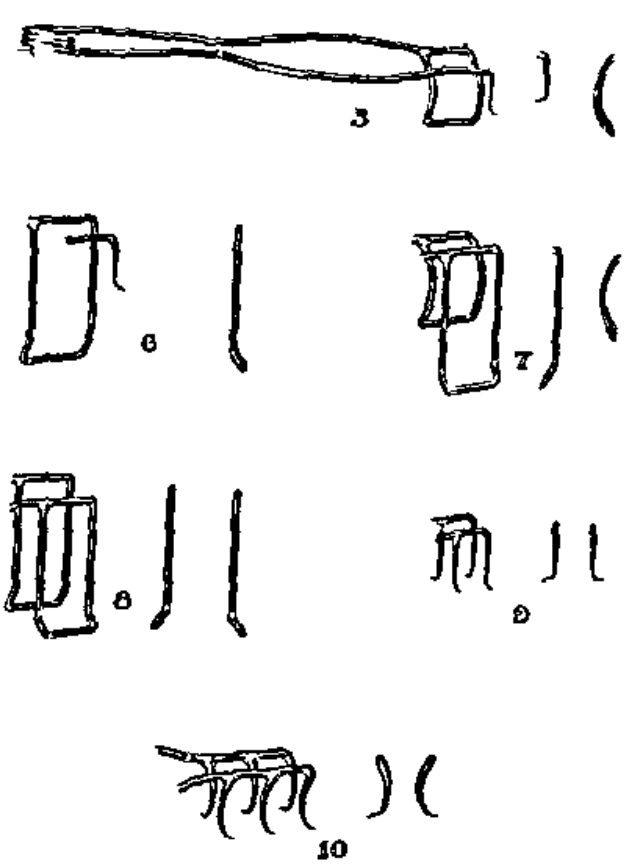


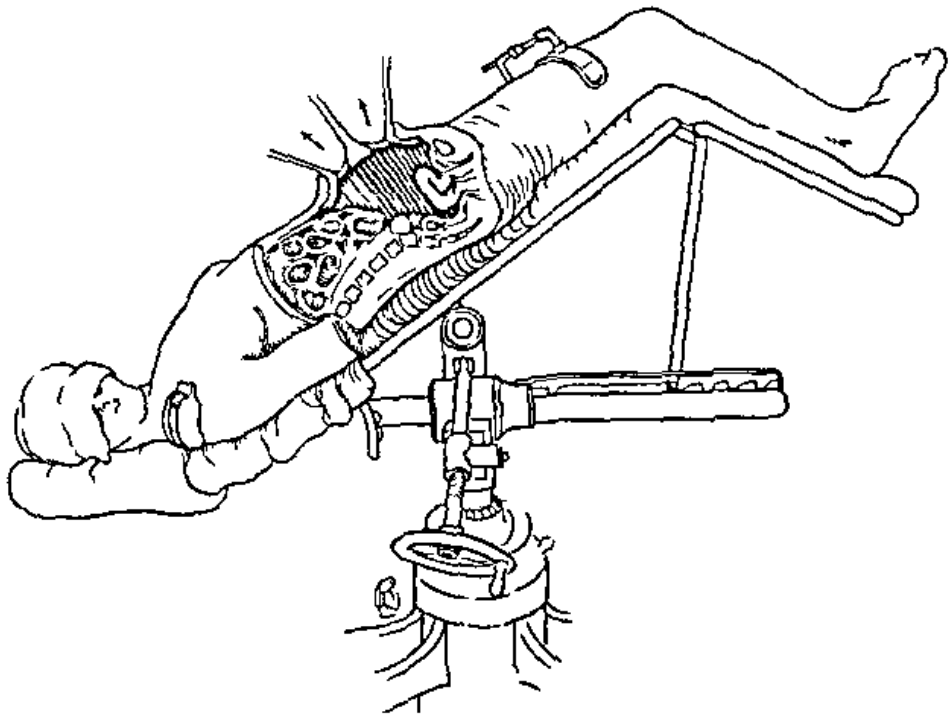
Fig. Automatic spring retractors

referred to as local anesthesia operations. Likewise many patients are operated upon under local anesthesia who are so deeply narcotized by preliminary hypodermic medication (twilight sleep or narcolocal anæsthesia) that the local anæsthesia employed plays only a minor role. Other cases are operated upon with local anæsthesia who complain so bitterly that it is a gross misdemeanor to employ the term anæsthesia at all.

The writer takes the position that only cases carried through to their completion without curtailing the operative procedure and without pain to the patient should be recorded as operations under local anæsthesia. Others should be designated as mixed narco-local, unsatisfactory, failures or psychic anæsthesia. Furthermore the *operating room performance* of a surgeon should be made to *coincide* with his public *discussions* and *writings* and vice versa. If this ideal could be maintained it would be much less difficult to evaluate the opinions of various surgeons who speak and write upon this subject.

GENERAL FACTORS WHICH INFLUENCE THE USE OF LOCAL ANÆSTHESIA IN ABDOMINAL SURGERY

Who shall administer the anesthetic? A point that cannot be too strongly stressed is the fact that local anæsthesia may be applied to abdominal surgery with a far greater degree of success by the surgeon who does the operation than by the method now being attempted in a few clinics in this country. The reason is obvious. Successful use of local anæsthesia in abdominal surgery often demands the introduction of the solution at successive stages of the operation by one who is in a position to deliver the proper amount to the indicated areas at the proper time. In fact anæsthetizing new areas becomes an actual integral part of the operation and no one but the surgeon can anticipate the demands of a given case and



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precede his maneuvers by the adequate introduction of the solution and at the same time so regulate his manipulations as to coincide with the effect of the anæsthesia given In some regions of the body in which complete areas may be anæsthetized as a preliminary to operation the other method may be applied with more satisfaction but in abdominal surgery local anæsthesia has not yet reached the stage where this may be done In abdominal surgery only intraspinal anæsthesia meets this demand and the writer feels that until this method has been proven more safe than general anæsthesia it cannot be recommended as a local anæsthesia method

INTRAPERITONEAL ANÆSTHESIA

Although it is many years since experts in the use of local anæsthesia began to develop method of obtaining intraperitoneal anæsthesia surgeons have as a rule failed to make use of the most important factor The indications for the use of local anæsthesia in this field must obviously be dependent upon the possibility of its satisfactory use In other words the scope of the local anæsthesia method for the individual operator must depend upon the satisfaction with which the indications may be met Among other things the personal equation plays an important role in the establishment of these indications

The writer's viewpoint in regard to the indications and scope of the carrying out of intraperitoneal procedures under local anæsthesia is such that he feels that it may be worth while to enumerate in more or less detail the means by which the method may be applied in intraperitoneal surgery

The introduction of more simple methods of inducing anæsthesia improvement in equipment and a more clear cut realization on the part of surgeons that many factors aside from the anæsthesia technique i e the method of meeting the surgical indications an all round improvement in the psychic care of the patient improved diagnosis properly chosen incisions and above all the induction of anæsthesia and the performance of the operation (without the production of pain or the reflex contraction of the muscles) have been the means of bringing to many surgeons a realization that the abdomen is a fertile field for the use of local anæsthesia

FACTORS WHICH INFLUENCE THE USE OF LOCAL ANÆSTHESIA IN ABDOMINAL SURGERY

With all of the above requirements met and the abdomen opened under anæsthesia which has not only prevented pain but has eliminated the reflexes of the abdominal muscles as well—the *latter requiring greater refinement of technique than the comparatively simple prevention of pain*—the successful completion of the operation will depend upon two factors namely surgical strategy and anterior splanchnic or sympathetic anæsthesia

Surgical strategy must be directed entirely toward obtaining an adequate exposure without the production of pain or the dreaded positive pressure or expulsive effort Obtaining the proper exposure offers the surgeon the opportunity for the establishment of anæsthesia of the sympathetic system after which practically any operative procedure *within the abdomen can be carried out*

ANÆSTHESIA OF THE ABDOMINAL WALL

All complicated methods are excluded and direct infiltration unless contra indicated is the method of choice Routinely the abdomen is opened in such a manner as to meet the indications mentioned above The walls of the incision are retracted or stretched by means of wire spring retractors (Figs 1 and 2) *The field is placed at the highest possible* level by tilting the operating table and all movable viscera are allowed to fall to lower levels (Fig 3) A stout smooth retractor (Fig 4) is used to elevate any desired segment of the abdominal wall and a visual examination is made This may be supplemented if necessary by palpation with the fingers All adhesions presenting will hang like bunting from a ceiling and may be severed (Fig 4) Through the psycho anæsthetist the co operation of the patient is utilized the control of the respiratory function being of the utmost importance Straining coughing sneezing or laughing are to be avoided

WRITER S METHOD OF OBTAINING INTRAPERITONEAL OR SYMPATHETIC ANÆSTHESIA

The posterior method of Kappis we use but rarely We have had no experience with the anterior method of Wendling The method which we employ is a modification of that suggested by Braun a we have found his technique a not uncommon cause of severe pain Seidel and Barouch have recommended the introduction of large quantities—up to 600 cubic centimeters—of a 1 per cent novocain solution into the free abdominal cavity Our experimental work on animals lead us to believe that this method would be extremely dangerous

We agree with Seidel and Finsterer that it is less difficult to anæsthetize the splanchnic area directly in the field of operation than to try to reach separately all of the branches which supply it paravertebrally It is an established fact that the sympathetic nerves accompany the vessels as a rule and this fact may be taken advantage of in inducing intraperitoneal anæsthesia The large arteries supplying the stomach colon small intestine spleen or uterus may be used as a guide in establishing anæsthesia The greater lesser or pelvic sympathetics may be reached through their ganglia or their immediate branches

In obtaining anæsthesia within the abdominal cavity it is our custom therefore to expose the area in which anæsthesia of the sympathetic system is to be established prior to its induction The tissues carrying the nerves *to the stomach spleen* pancreas colon small intestine appendix and pelvic viscera are accessible in the vast majority of cases and though intraperitoneal anæsthesia is by no means always necessary it can usually be established when required provided strategy is employed As stated we have almost universally found the introduction of the fingers and retractors for the purpose of palpating the large vessels and the vertebral bodies so that the needle might be introduced by the guidance of the finger alone a cause of considerable complaint on the part of the patient (Braun Allen Labat Finsterer and others agree that it is not unusual when attempting this method to be compelled to give inhalation anæsthesia on account of the pain produced) Introducing the solution retroperitoneally under direct vision is therefore the method we have developed and advise

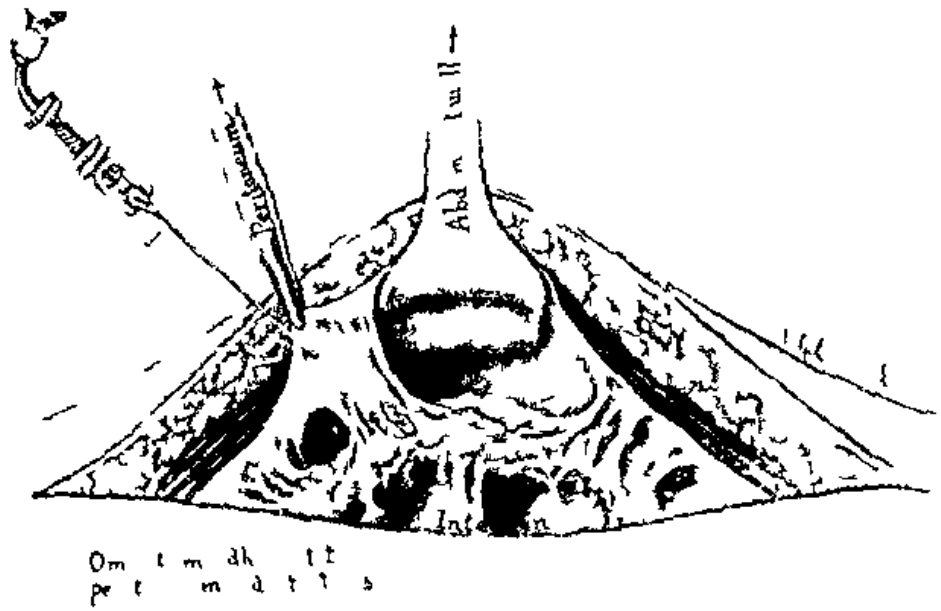


Fig 4 Visceroparietal lines Vertical retraction Negative pressure Local infiltration at the point of attachment (From Pratt Local Anesthesia 1923)

The regions aside from the greater splanchnic area which may be reached between the liver and the duodenum and the pelvic sympathetics at the pelvic brim are the mesenteries of the large and small bowel—always in close proximity to the large vessels (superior and inferior mesenteric and their branches)—the splenic pedicle the mesoappendix and the round and broad ligaments (Figs 5 and 6)

Exposure is the key to success visceroparietal and visceravisceral adhesions may be severed without producing pain Gentle lateral and vertical retraction as illustrated (Fig 4) will make it possible to deliver the required solution to the appropriate points directly under the vision The peritoneal surface may be observed as it swells under the pressure of the injected fluid and there need be no fear of introducing the solution into the circulatory system The most important region i e the one by which peritoneal sensation is most largely governed lies between the duodenum and the liver This space may almost always be exposed provided the stomach is empty and extensive inflammatory or malignant disease is absent by methodically carrying the duodenum downward the liver upward the stomach to the left and the contents of Morris pouch to the right (Fig 7) The falciform ligament and the gastrohepatic omentum may be drawn toward the left shoulder It should not be forgotten that the round ligament of the liver is one of the most sensitive tissues in the abdominal cavity and should be thoroughly and deeply infiltrated as soon as the upper abdomen is opened Likewise all anterior parietal peritoneum should be rendered anæsthetic by a subperitoneal infiltration throughout the area with which contact is to be made

After opening the abdomen retraction becomes the most important factor in gaining the exposure upon which the induction of the sympathetic anæsthesia depends Rigid forceful uneven or asymmetrical retraction will almost invariably bring about the dreaded expulsive effort on the part of the patient and bring from the surgeon's lips the remark

Just at this stage I like to give the patient a little general anæsthesia On the other hand the consistent use of flexible mild elastic symmetrical continuous lateral and vertical retraction developed stealthily and combined with the utilization of the force of gravity which is dependent upon the proper tilting of the operating table into the desired plane by means of the worm drive will almost invariably present to the surgeon's view the sympathetic ganglia or trunks which supply

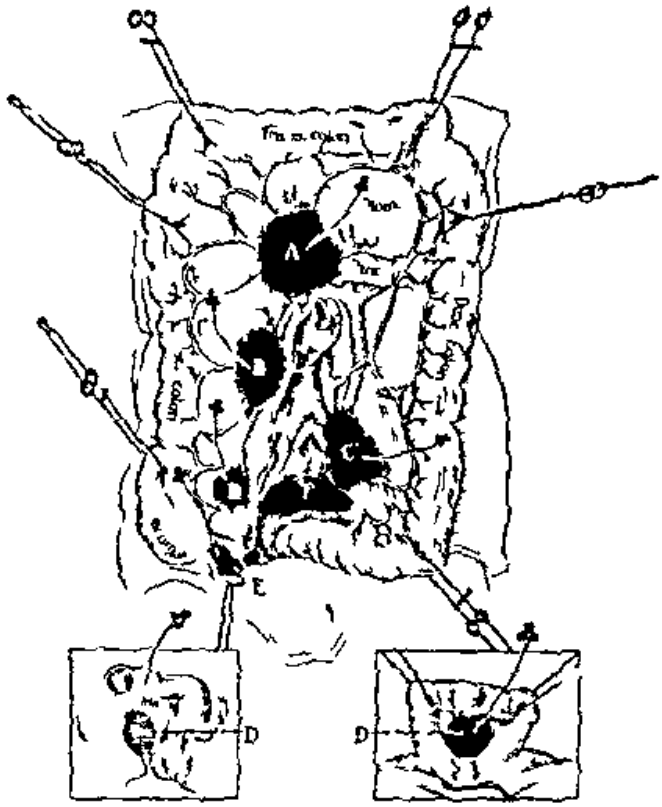


Fig 5 Local Anæsthe a of the bdominal ympath ti \ tem Mese tery f the tra sv rse c lon b mese tery f the sce ding ol c mesentery of the desce d ng lo d mes tery of the sm ll nte t e e mesentery of the ppend f pel i symp th ti s

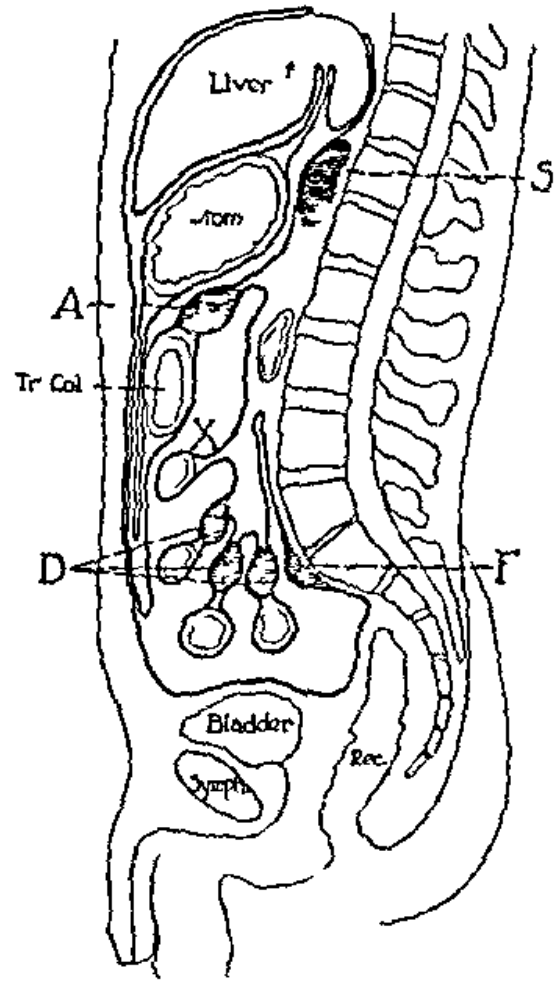


Fig 6 Local a esthes of th abd m nal sympathet c tem sagittal w \ \ rmal mese tery f the small ntest e S great r pla chn re A mese tery of the tran erse col n D mesent ry f mall intest e F pel c ympath t c

the area to be attacked surgically (Figs 3 to 5 and 7)

This area may be superficial or deep de pending upon the pathology the proportions of the patient or the region involved When not readily accessible equipment becomes for the moment the all important con s deration Anæsthetizing the pelvis of a stout individual the solar plexus or the flexures of the colon may demand an ex treme degree of strategy as well as adequate equipment Here the cut off of the pneumatic injector (Fig 7) which may be used without obstructing the surgeon s view unquestion ably shows its superiority over the syringe and not infrequently makes possible the establi hment of intraperitoneal anesthesia under circumstances in which it would otherwi e be necessary to admini ter inhala tion anæsthe ia The po es ion of equipment uch as artificial light elastic retraction and a table which may be tilted into the desired plane without di comfort to the patient by means of the worm drive so that the force of gravity may be utilized not infrequently becomes the deciding factor between the com pletion of the operation under local anesthe sia or recourse to inhalation anesthesia

The operative procedure having been de cided upon anterior sympathetic anæsthesia should be establi hed as indicated For the purpose of illustration the technique of cholecystectomy may be described a strip of gauze is laid over the pylorus and a loop of a No 6 retractor (Fig 7) gently forces it to the left Another carries the duodenum downward while a third carries the colon and omentum found in the pouch of Morris to the right The surgeon may now step away from the operating table and have the sa i faction of seeing the patient at the suggestion of the

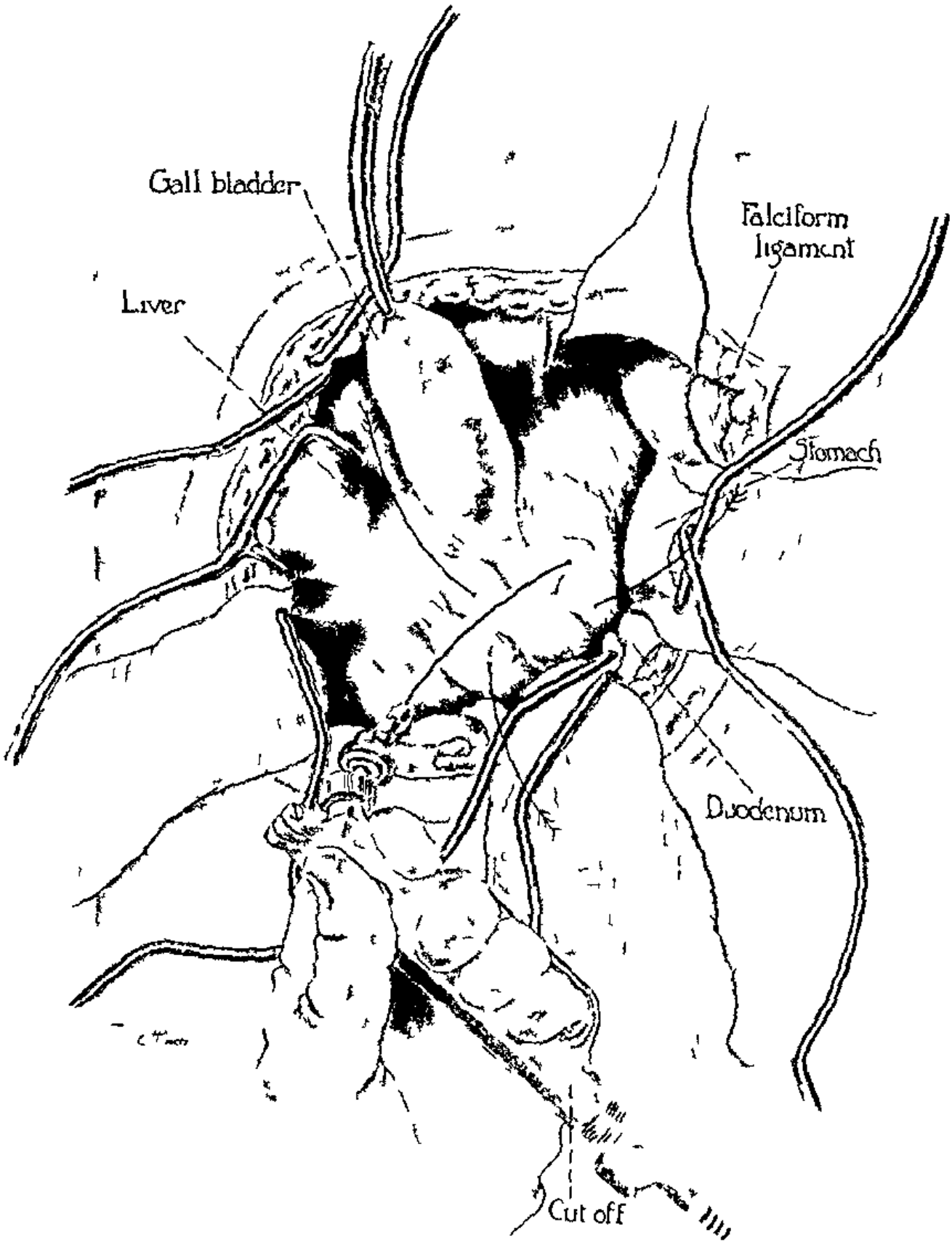


Fig. 7. Local anæsthesia of right half of transverse mesocolon. Anæsthesia of the greater splenic omentum and anterior surface of

psychic anesthetist extrude his gall bladder and the edge of the liver well outside the abdominal wall by inhaling deeply A smooth retractor draws the lower edge of the liver upward exposing the hepatic duodenal pouch Finally introducing the needle through the peritoneum this area may be completely anesthetized If the exposure is made in this manner the test may be done without pain (Fig)

CONCLUSIONS

In conclusion the writer would reiterate the following fact

Local anesthesia possesses many advantages when applied to intra abdominal surgery

Many of the objections to its use are based upon its improper application

Anesthetic methods should be simplified as much as possible and the surgeon who essays the use of local anesthesia should possess appropriate equipment and sufficient training to enable him to administer his own anesthetic

The term local anesthesia operation should be used to signify only operations which are carried to their completion without curtailment and without pain or the addition of other drugs

With an exhibition of the appropriate technique complete anesthesia may be painlessly established for the performance of a vast majority of abdominal operations

And finally the consistent use of local anesthesia in this field demands adequate equipment and an adherence to fundamental principles the most important of which are the psychic preparation of the patient painless induction of the anesthesia of the abdominal wall elastic retraction exposure which allows the establishment of intraperitoneal anesthesia and a surgical technique compatible with the best interests of the patient

THE RADICAL CURE OF HÆMORRHOIDS BY THE CLAMP AND CAUTERY METHOD, EMPHASIZING THE VALUE OF SACRAL ANÆSTHESIA

A Study of Six Hundred Consecutive Cases with but One Death

By HARRI R SYMS M D F A C S New York

WHILE I have but little that is new to add to this important topic I feel that I am more than justified in writing this article

In the first place I have 600 consecutive operations to report and from them we can certainly draw deductions

In the second place sacral anæsthesia has been developed recently as applied to this and allied operations I regard sacral anæsthesia as one of the greatest additions to surgery In our 600 cases there was but one death and that due to pneumonia from ether Had we used sacral anæsthesia we probably would have had a 100 per cent recovery

In the third place certain modifications and innovations which I think are detrimental have crept in and I hope this paper may succeed in emphasizing certain important facts and in dispelling certain illusions

Finally I feel that the clamp and cautery method of operating is the best It is the safest and that should be our first reason for adopting any method of operating for any condition It is safer than the injection it is safer than the ligature in fact it is safer than any other method of operating for hæmorrhoids

It may be classed as radical No other method comes as near being a radical procedure except the Whitehead operation and for obvious reasons the Whitehead operation is one which should never be performed

It is the most comfortable and least painful method There is an easy convalescence resulting in perfect recovery It is so far ahead of the incomplete operations such as injections electric punctures single ligation etc that it should be given preference whenever a patient can afford to spend 2 or 3 days in bed There was the objection that a general anæsthetic had to be given Sacral anæsthesia has done away with this

We were able to tabulate 600 consecutive cases operated upon in my service at Lebanon Hospital Of these 599 recovered and 1 died making a total of 600 cases

The sex was noted in 573 cases and it showed the interesting fact that there were 475 males as against 98 females there being nearly 5 males to 1 female

The age was noted in but 440 cases Of these there were but 4 patients under 20 years of age and but 13 patients over 60 years of age so that the majority (423) of these patients ranged between 20 and 60 years of age

Sacral anæsthesia was attempted in 64 cases and was successful in 61 of these In other words we succeeded in over 95 per cent of our attempts

There was but 1 death and this was due to pneumonia following the administration of ether

There were no serious complications and none of these patients remained long in the hospital Usually they were discharged within 4 or 5 days but occasionally they remained as long as a week

Retention of urine occurs occasionally but not often

We feel that the results obtained in this series of cases justify us in the high regard we have for the method employed

Sacral anæsthesia is by this time a well established procedure Its details have been sufficiently worked out so that it has long since passed the experimental stage We know now pretty accurately what we can do with it and how it should be done By its employment the region of the perineum and lower rectum can be thoroughly anæsthetized with a minimum of risk It must be borne in mind that sacral anæsthesia is not spinal anæsthesia Spinal anæsthesia is dangerous sacral is not Local anæsthesia by the infiltration method in a region which can not be surgically sterilized is decidedly dangerous As far as we know sacral anæsthesia if properly administered is practically free from risk Sacral anæsthesia enables us to employ a radical procedure such as the clamp and cautery operation or perineal prostatectomy upon patients who would otherwise have to be considered inoperable In other words it takes certain patients who are bad surgical risks out of the inoperable class and offer them a chance of cure

I did not begin to employ sacral anæsthesia until the fall of 1918 so that in this series of 600 cases we attempted to use it in but 64 In this series of 64 cases we were unsuccessful in 3 We





were successful in over 95 per cent Abnormalities of the sacrum excessive flexure over the lumbosacral articulation sometimes may make it difficult or impossible to introduce the needle properly

When successful sacral anesthesia is obtained for these operations The patient is conscious but is absolutely free from pain the sphincter can be dilated fully the rectum satisfactorily explored and the hæmorrhoidal operated upon with deliberation and precision After the operation the patient is not entirely free from the disturbing effects of general anesthetics but has first post operative hours are rendered comfortable because the anal region passes off slowly

METHOD

The operator must be familiar with the anatomy of the sacrum to employ this method successfully

Thirty cubic centimeters (about 1 ounce) of a proper solution of novocain is injected into the sacral canal The entrance to the sacral canal is to be found at the hiatus sacralis The hiatus sacralis is indicated by two cornua or tubercles of bone They mark the lower end of the sacral canal They exist because of the absence of the *fifth* spinous process *of the sacrum* They can be felt just above the junction of the coccyx with the sacrum The needle must be introduced between *the cornua in the axis of the sacral* canal It passes through the drum like fibrous membrane which covers the lower end of the canal After this membrane has been passed the needle must not be introduced more than 2 centi

Fig. 2 Lateral view of sacrum showing sacral foramina

meters If the end of the needle is properly in the canal there will be but little resistance to the flow of the fluid It will be as though the injection were being made into a cavity After infiltrating the skin and superficial tissues with novocain solution the *needle is tacked* from the syringe should be introduced into the canal and watched to be sure there is no *flow of blood or cerebrospinal* fluid Should blood flow the needle is in a vein and must be readjusted before the injection *Cerebrospinal fluid will not flow* unless the needle used is too long Withdrawing the needle slightly overcomes the difficulty This is something I have never encountered When the needle is properly in the canal the syringe is attached and 30 cubic centimeters of the fluid are injected Lack of pressure resistance proves that the injection is being made into the canal

I employ a solution of novocain about 1½ per cent although 1 per cent is often strong enough Some operators employ as high as 2 per cent Adrenalin is not necessary but I have used it in the majority of cases having employed novocain tablets or ampoules which contained it The anæsthesia begins in about 8 to 10 minutes it should be complete in 20 It will last 1 or 2 hours, and the operation may be begun as soon as the anal margin is free from sensation

As the operative procedure is based on certain anatomical and surgical lines it is well for us to consider what may be called the anatomy of hæmorrhoids

The veins of the rectum empty *both into* the general and into the portal circulation For our purpose it is not necessary to go into the question very deeply Just *above the anorectal* line there are numerous small venous sacs called pools. These are elliptical in shape and about the size *of a grain of wheat* These little pools surround the rectum and from them small veins proceed in all directions to form an intricate network completely encircling the rectum This is the internal hemorrhoidal plexus *The veins from* this plexus

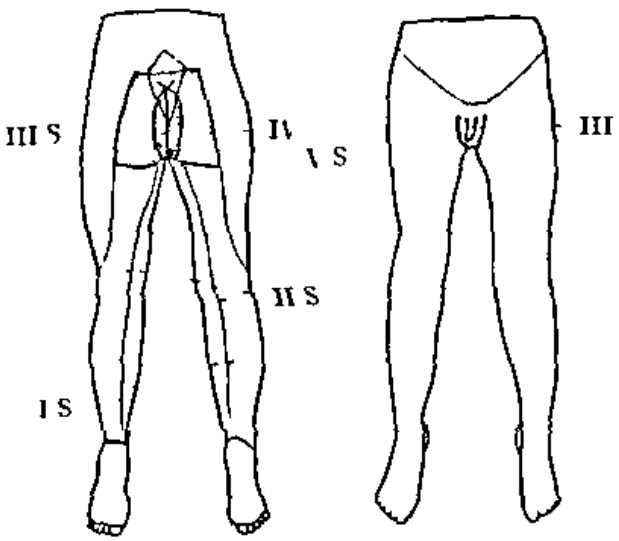


Fig 3 Diagrammatic view showing the internal distribution

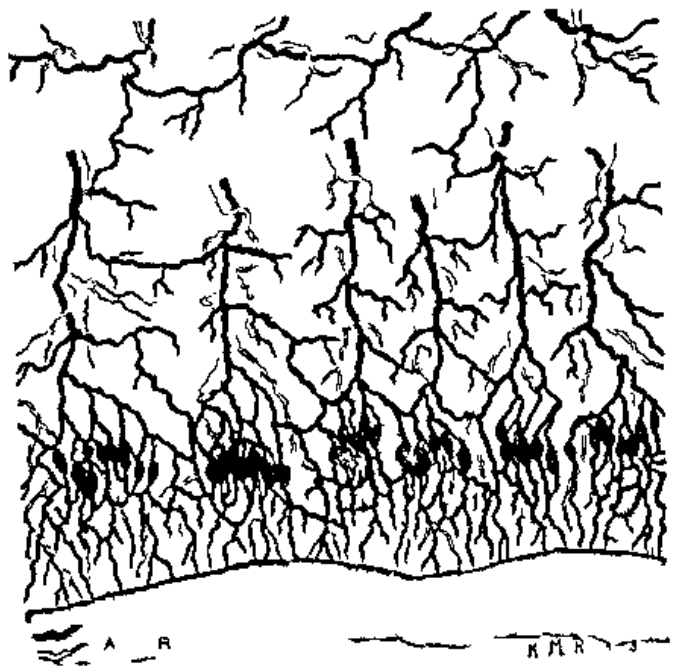


Fig 4 Rectal supply showing hæmorrhoidal pool (partly schematic) (Redrawn from Tuttle)

empty into the portal system They are without valves and because of man's upright posture and the great length of the veins they have to sustain a good deal of hydrostatic pressure As they are being but poorly supported by surrounding tissue it is no wonder they readily become dilated and form hæmorrhoid Above the level of the internal sphincter these veins unite to form trunks which penetrate the muscular walls of the gut These venous trunks unite above to form the inferior mesenteric vein thus emptying into the portal circulation

The important fact is that hæmorrhoids are really varices or dilatations of some of the branches of the internal hæmorrhoidal plexus

As time goes on there is an increase of fibrous tissue surrounding the varices so that a hæmorrhoid consists of more than a dilated vein or venous sac it consists of a varix surrounded by a more or less dense fibrous tissue It is necessary to bear this anatomical arrangement in mind when we come to apply our surgery

THE OPERATION

Breaking the continuity of the internal hæmorrhoidal plexus into three sections it becomes practically a radical procedure As the wounds made by the clamp and cautery are in the long axis of the canal they do not tend to cause stricture as might result if the clamping were improperly done across and not with the long axis If contraction takes place it will shorten the rectum not narrow it As far as infection is concerned it is safe because the crushing and cauterizing of the hæmorrhoidal stump or base close the lymphatics and capillaries The burning with the cautery thoroughly sterilizes the stump as no other method can By the time the eschar comes away the lymphatics and capillaries will have been blocked so that secondary infection is prevented If crushing and burning the skin at the anal margin are avoided the patient will be free from postoperative pain

Usually the operator grasps three hæmorrhoidal masses one on each side of the posterior commissure and one near the anterior commissure This breaks the plexus into three sections as stated above Intervening masses if any will shrink and seldom is it necessary to operate upon anything more than these three

The instruments essential are several pairs of hæmorrhoidal forceps a hæmorrhoidal clamp a pair of scissors curved on the flat a cautery and of course a rectal speculum

Hæmorrhoidal forceps such as Tuttle's or Pennington's have their blades at an angle with their handles The blades are corrugated or toothed and about ¾ inch in length

I prefer Kelsey's modification of the Smith clamp It has two strong flat blades tongued and grooved about 2¾ inches in length Kelsey's model is perfectly satisfactory and I would advise against any modification of it especially against ivory plates on the under surface of the blades These interfere with the proper clamping and crushing of the hæmorrhoids and with the proper sterilization of the stump

There is nothing better than a Paquelin cautery in working condition but it is difficult to keep in

order Perhaps the best cautery is an electrical one if the blade is sufficiently large A practical cautery is a set of small soldering irons which can be heated over a gas stove

Operative procedure After the patient has been anæsthetized with sacral anæsthesia he is placed in the lithotomy position with the foot of the table a little higher than the head and with the patient s hips slightly overhanging the end of the table The operation consists of the following steps

1 Resection of prominent skin tabs flush with the anal margin

2 Dilatation of the sphincter muscle Dilatation of the sphincter muscle is a most important part of this operation and of nearly all operations on the lower rectum The object is to stretch the sphincter so as partially to paralyze it for a few days This will prevent spasm and postoperative pain It should be done gently and slowly by introducing two fingers and finally both thumbs into the anus and slowly but firmly stretching the sphincter anteroposteriorly until the muscle yields There should be no tearing but thorough stretching of the muscle I believe that this is accomplished better with the hands than with one of the instruments devised for this purpose

3 Exploration of the rectum Explorations of the rectum should be thorough and of course can be accomplished much better with the parts anæsthetized and with the sphincter thoroughly dilated The final diagnosis should be made at the time of the operation

4 Grasping of the three hæmorrhoidal masses in hæmorrhoidal forceps The operator should isolate distinctly three prominent hæmorrhoidal masses one on each side posteriorly and usually one near the anterior commissure They should each be grasped with good hæmorrhoidal forceps so that the hæmorrhoidal clamp may be surely applied satisfactorily to each mass

5 Application of the hæmorrhoidal clamp to one of the masses crushing the same after having cut with the scissors a groove through the skin margin A groove should be cut with the scissors at the anal margin in which the hæmorrhoidal clamp will lodge The skin margin should not be crushed nor burned The hæmorrhoidal clamp must be placed in the long axis of the bowel preferably with the heel at the highest portion of the tumor The clamp should be closed and screwed down crushing the hæmorrhoidal mass as completely as possible

6 Cutting off the redundant hæmorrhoidal tissue with flat scissors The redundant tissue should be trimmed off with flat scissors leaving about ¼ inch of the tissue above the clamp

7 Cauterization of the stump above the clamp The cauterizing of the stump must be done slowly and carefully If a Paquelin cautery is used a dull cherry red is preferable to a bright white heat The object is not to cut away this tissue with the cautery but to char it thoroughly so that it will remain as a firm eschar

8 Treatment of the remaining hæmorrhoidal masses with the clamp and cautery After treating the prominent masses a fourth mass may be punctured with the cautery or clamped and cauterized but this is not usually necessary and should rarely be done The continuity of the hæmorrhoidal plexus having been destroyed remaining varices are pretty sure to disappear

9 Application of a proper conical pad and T binder I regard the immediate dressing almost as essential as certain steps of the operation I apply directly over the anus a pad made of twelve thicknesses of gauze folded into a wide cone shape firmly held by a T binder This pad must not enter the anus Its purpose is to act like a truss and support the anus so that the hæmorrhoidal area will stay well within the external sphincter There will be little or no swelling and œdema and there can be no strangulation of the tissues If the skin has not been crushed or burned the patient will be practically free from pain

The practice of inserting into the rectum a so called dressed tube that is to say a rubber tube surrounded with gauze and tied into a spool shape is a pernicious one I call this an artificial corncob Binnie says it should be reserved for personal enemies and public malefactors It can only add to the danger of hæmorrhage by prematurely disturbing the eschar and to the danger of infection by rubbing material into a raw surface If this paper can aid in doing away with this practice I shall feel that it was worth the writing

The after treatment is very simple The bowels should never be tied up Morphine and opium are not used they are not necessary We give the patient mineral oil beginning with the night of the operation and three times during the next day We expect the bowels to move on the second day after the operation If the oil does not accomplish this we give a mild dose of sodium phosphate or other saline laxative The tight compress should be worn for 4 to 48 hours thereafter the patient will merely need a pad for cleanliness These patients are notably comfortable and are able to be up and about within 2 to 4 days and to resume their occupations within less time than a week

SIMPLE EXCISION IN CERTAIN CASES OF DUODENAL ULCER[1]

By LeGRAND GUERRY M D F A C S Columbia South Carolina

I BELIEVE that when operating for duodenal ulcer excision of the ulcer should form a vital part of the operation whenever possible It matters not what the method of attack is pyloroplasty gastroduodenostomy or what not I do not say that excision should always be done for the word always has little if any place in surgery Oftentimes it is not possible to practice excision My contention is that the principle is basically sound and should be applied whenever conditions permit

What we should be seeking primarily in this as well as in other fields of surgery is the understanding and establishment of certain great principles that must underlie all of our work if it is to endure No method that does violence to basic principles contains in it the elements of permanent success

Such wonderful strides have been made in recent years on the mechanical side of surgery method and technique have been so developed and amplified that we at times lose our way and confuse principle with method and method with principle For example probably the limit has been reached so far as method is concerned in radical operation for carcinoma of the breast I seriously doubt if any more extensive operative procedure *per se* will materially reduce the incidence of recurrence in breast carcinoma but getting the cases earlier will

The mortality in acute intestinal obstruction is nearly as great today as it was 50 years ago with all of the brilliant improvements in technical work Here again method has practically reached its limit and is unable to do more for us

What I am trying to say is that much of our trouble certainly most of my trouble in failure to cure duodenal ulcer is not due to any lack of operative schemes or their technical performance but failure to select the methods which will most fully meet the need in each individual case Thinking more in terms of method than in terms of principle the way is lost

Conclusions are very dangerous things to draw yet we are willing to risk this one No one operation is suitable in all cases of duodenal ulcer and no one operation will cure all cases

To use one method exclusively is to invite failure We must have many strings to our bow And the heart of the surgical problem is to understand the principle involved so clearly that the method elected will most surely convert such principle into practice

Quoting from a former paper of mine read before the Southern Surgical Association 1921 on the choice of operation for duodenal ulcer John

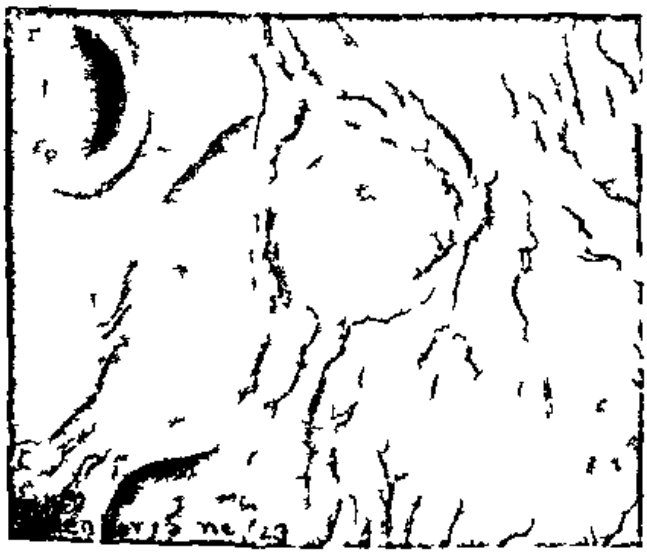


Fig A Jra gh th t pe f t m h l
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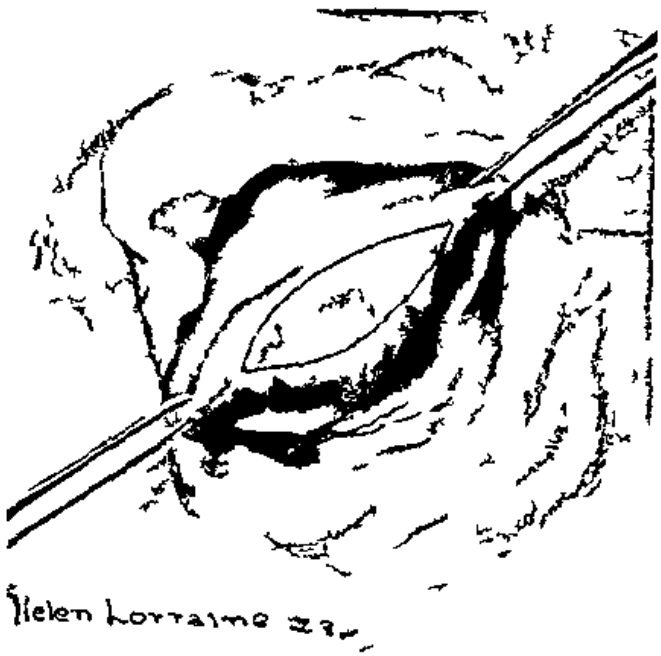


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Hilton in his truly great book on rest and pain lays bare the principle that must govern successful treatment of all ulcers Hilton says in speaking of the process of repair in wounds in primitive man Pain was made the prime agent Under injury pain suggested the necessity of and indeed compelled him to seek for rest Every deviation from this necessary state of rest brought with it through pain the admonition that he was *straying from the condition essential to his* restoration He must have observed with astonishment the breaking asunder of the newly formed tissue or the steady development into normal structure which occurred in exact accordance with the disturbance or rest to the parts which the sense of pain had enabled him to regulate so accurately and to employ so beneficially for his own personal relief and comfort What *I have here endeavored to inculcate is that growth* and repair bear an exact relation to due physiological rest local and general

This principle applies fundamentally to the cure of all ulcers The method which comprehends this fact will endure the one which does not cannot endure For in a very real sense there is no difference between ulcer of the leg ulcer of the rectum or ulcer of the duodenum The same principle underlies the process of growth and repair in both animal and vegetable kingdom Just as sleep is man s greatest earthly solace bringing physiological rest to his tired body and brain so *mechanical and physiological rest to* the local ulcer area is *the one great essential of* repair Let us remember also that just as the body chemistry is changed during the process of physiological rest to normal alkalinity so the chemistry of the ulcer area will be likewise changed by mechanical and physiological rest locally applied this in turn means a healed ulcer

With what has been said as a yard stick let us *see if we can fairly measure the value of simply* exciting the ulcer in that small group of cases in which the method is applicable The illustrations will make this point clearer

As seen in Figure 1 it is certainly not good practice to divide the pyloric sphincter unless there is some real reason for so doing In a large freely mobile duodenum with a perfectly discrete ulcer on the anterior surface of the cap situated *¾ inch or more from the pyloric sphincter and* not in any way within the bite of the sphincter such an ulcer can be cured by simple excision The great need for dividing the pyloric sphincter is to help supply mechanical and physiological rest to the operative area When the ulcer is completely off of the sphincter beyond its grasp we gain nothing by dividing the sphincter As a matter of fact final decision for simple excision is not made until after the ulcer has been excised and the whole ulcer bearing area of the duodenum subjected to most careful direct inspection

Frequently two ulcers are present When this is the case it is still possible to manage satisfac

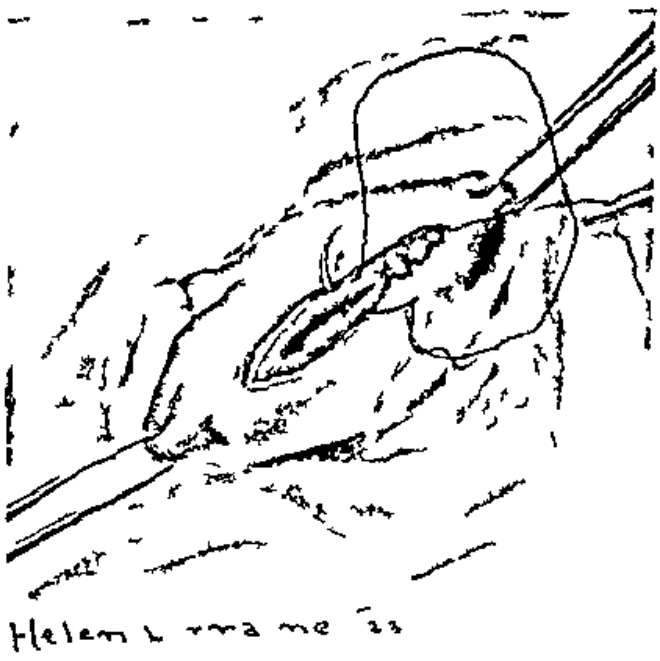


Fig 3 First sketches

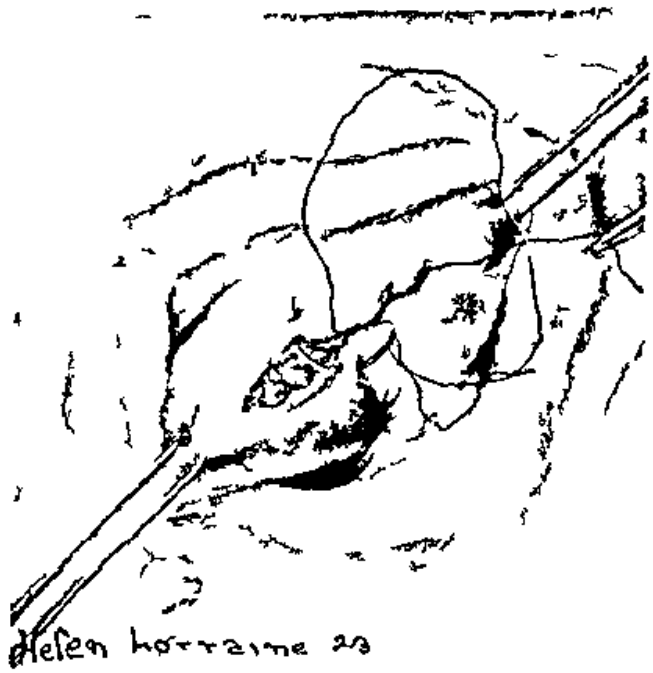


Fig 4 Second sketches with operation completed

terly the second ulcer through the opening made by the excision or if it seems best after the duodenum has been inspected it is perfectly feasible to convert the excision operation into a pyloroplasty preferably of the Finney type This matter of inspection of the duodenum is an important point in the operative procedure because of the valuable information gained

Figure 2 shows that when the ulcer has been completely removed practically all is accomplished that can be accomplished and certainly the principle of applying mechanical and physiological rest to the inflamed area as the basis of cure for ulcer obtains when this has been done

Figure 3 There is no interference with the segmental activity of the stomach hence neither the mechanics nor the physiology of the stomach has been disturbed

We are quite certain that when the case has been properly selected this simple method will secure a very high percentage of complete symptomatic cures and as Dr Judd so well pointed out in a paper by Dr Rankin and himself published in the August number of SURGERY GYNECOLOGY AND OBSTETRICS 1923 that the operation will be done with increasing confidence We are particularly glad to quote the following from Dr Judd's paper already referred to because it bears directly on the point that we have been insisting upon In the light of the present knowledge of the cause of gastric and duodenal ulcers it is logical to remove the offending lesion together with the foci of infection rather than to trust to a side tracking procedure which leaves a pathological entity in which healing is a moot question and in which exacerbation gives rise to a chain of symptoms similar to those for which the patient first sought relief The author in this same paper also points out that in the series of cases treated by the method of excision there has never been an occasion to supplement the operation by gastro-enterostomy because of pyloric stenosis

We have no unusually large number of ulcer cases from which to draw conclusions yet surely the experience is extensive enough with careful study to be most suggestive Cases treated in this way convalesce most smoothly and comparatively speaking are freed from many of the distressing postoperative sequelæ If the principle is right then our contention must be a close neighbor to the truth

DIRECT LEVERAGE IN THE REDUCTION OF CERTAIN FRACTURES

By JAMES T M THOMSON AB MD FACS Lincoln Nebraska

LEVERAGE and the use of levers in the reduction of fractures are old and well tried agents The technique of applying direct leverage to broken bones varies in the hands of different operators therefore in the following technique one merely add the element of fixation to the method described by Hugh Owen Thomas the famous Liverpool Surgeon in his *Contributions to Surgery and Medicine* published about 50 years ago A quotation from this volume relative to the procedure herein followed is interesting

My failures continued (speaking of old backward dislocations of the first phalanx of the thumb) for a long time before I bethought myself of applying to these dislocations a mode of operation which I was constantly applying to compound injuries of joints and fractures if not immediately reducible It is far better to apply a trustworthy plan though it involves the compounding of the dislocation which is better than irretrievably injuring the part by delay and frantic efforts at reduction which is probably impossible The operation which must succeed is extremely simple Dr Thomas through a small stab wound incision near the base of the thumb on the palmar surface would insert an S shaped lever and with its end behind the head of the first phalanx he would lift it up and with traction on the thumb lever it into the joint socket (Fig 2)

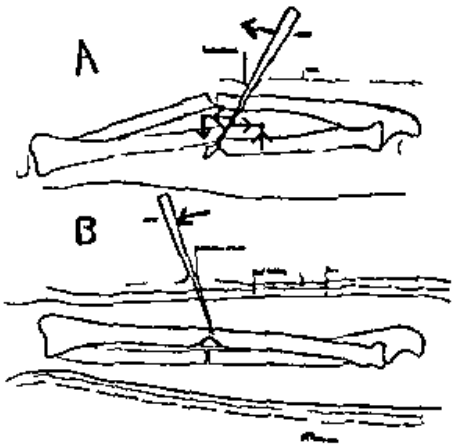


Fig A Fracture of middle third of radius and dislocation of lateral head of ulna showing lever inserted through puncture wound and displacing fragment of radius Lever is directed toward fracture B Shows position of lever after fracture of radius and fragment replaced Plaster of Paris splint applied holding fragment in place thereby preventing dislocation of ulna

Some 4 years ago when associated with Dr J Stanley Welsh of this city we had a Colles fracture which was extremely difficult to reduce At Dr Welsh's instigation a small instrument was forced through the skin over the lower end of the radius Under the fluoroscope it was pushed between the fractured ends and the fragment levered into position It was found however that when the apposition was accomplished the lever was essential to maintaining proper position for when the leverage was relea ed the position was lost At my suggestion in this case we embedded the lever in the cast and maintained excellent apposition in this manner Dr Welsh's report of this procedure and its future possibilities if used for the reduction of fractures of other bones appeared in the *Journal of the American Medical Association* The result was so pleasing that often since that time in my experience when manual manipulation failed to bring absolute reduction this form of direct leverage was attempted with uniformally successful results

To the present we have used this method successfully in reducing fractures of the clavicle humerus radius and ulna (one or both bones) femur in fractures about the ankle and metatarsal

J Am M A



Fig Drawing illustrating S shaped lever and Thomas method of application to reduction of dislocation of first phalanx of thumb (After Hugh Owen Thomas)



Fig 3 A Fracture of the lower third of the radius and ulna B Fracture reduced showing the embedded ends of the fragments

tarsals It is our opinion that this procedure should not be followed except after a reasonable effort at manual manipulation has failed The technique of this procedure can be more simply carried out under the fluoroscope however it is just as applicable if an incision is used large enough to admit the forefinger into the wound so that with the aid of the finger as a guide to the lever the apposition of the fragments can be assured When this work is done under the fluoroscope there is a minimum amount of trauma and also the least possibility of infection but in fractures of the femur and leg bones where fixed traction must be maintained on a fracture table the fluoroscope is not practical

In a fracture of the forearm in the middle third for example the type of lever we use is an ordinary dental probe with a rounded end Where heavier levers are needed we use one fourth inch round steel 8 to 12 inches long with a blunted point After the field has been thoroughly cleansed and operator and instruments prepared the anæsthetized patient is placed on the X ray table with the extremity under the fluoroscope Before dimming the light (Fig 1 1) a small stab wound is made with a scalpel over the fractured fragments at the most convenient position for the application of the leverage The point of the lever is inserted in the small wound When I first did this work I simply pushed the instrument through the skin but the pressure necrosis around the lever was sometimes rather disagreeable but the small incision has relieved all pressure on the skin With the lever inserted into the wound an assistant by grasping the hand of the patient makes traction on the extremity Lights are dimmed and guided by the use of the fluoroscopic screen we pass the lever between the ends of the fragments in the same plan with the overriding and displacement the end of the lever being inserted to the medullary portion of the under fragment Then the lever is brought through an arc toward the upper fragment making pressure forward and downward against the upper and backward and upward against the under fragment The operator s free hand aid in perfecting the alignment



Fig 4 A Fracture of the middle third of the radius and ulna B Reduction by the use of two levers The lever inserted through the wound has been removed but the loss of apposition of the fragments



Fig 5 A Fracture of middle third of femur which has been treated by the open method—3 weeks old B After manipulation and reduction by the application of direct leverage Full length with apposition of fragments



Fig. 6.—Same patient as shown in Figure 5. Reduction accomplished by means of direct leverage. Lever embedded in cast for fixation of fragments.

and apposition. Sterile dressings are placed about the lever and saturated with alcohol. Sterile sheet wadding bandages are applied to the extremity and the plaster of Paris cast over this anchoring the lever in the position which maintains apposition of the fractured fragments (Fig. 1, *B*). The cast should extend from the upper third of the arm to the base of the fingers, the forearm flexed to an angle of 90 degrees with the arm and in supination, the hand in dorsiflexion. When the cast is hard, the end of the lever can be sawed off so that the patient will not bump the lever and cause displacement of the fragments. After a week or 10 days a small opening in the cast around the lever is cut and the lever pulled out. By this time callus has begun to form and approximation is relatively assured. When both bones are overriding, two levers may be used and both of them be embedded in the cast.

When it is impossible to use the fluoroscope in applying this technique as in fractures of the leg and thigh, where five traction must be maintained on the fracture table, it is best first to obtain full length of the limb by means of traction and then make a small incision just large enough to permit the insertion of the lever and the index finger to the fracture fragments. With the finger as a guide the lever is forced between the ends of the fragments and leverage applied as previously described. A few stitches are needed to close the wound, the lever is embedded in the plaster cast as before.

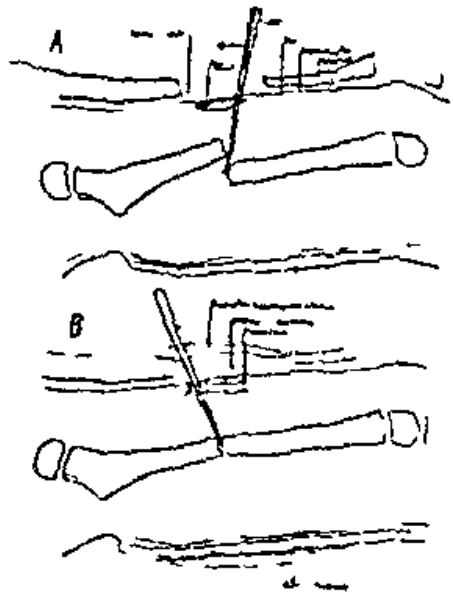


Fig. 7.—Same patient as shown in Figures 5 and 6. Illustrating the technique of applying leverage. *A*, Shows window in cast, small incision, lever inserted between fragments. *B*, After reduction. Wound closed. Plaster reinforcement over and around fixation of lever.

I wish to report four cases illustrating certain phases of this technique.

The first case is a young man who fell and broke the radius about 3 inches from the hand (Fig. 3, *A*). Manipulation did not reduce this fracture. The lever was inserted after the manner first described and the apposition was completed (Fig. 3, *B*).

In 8 days the lever was removed and also the cast was changed as it had been necessary with the first cast to place the hand in the so-called position of rest in the approximation. On the second visit the hand was put in dorsiflexion and the forearm in pronation. Three weeks later the patient reported, the fracture was entirely healed, and physical therapy was instituted. At the end of 6 weeks he had no disability.



Fig. 8.—*A*, Old fracture of middle third of femur. *B*, Reduction accomplished by means of double leverage directly applied to both fragments and embedded in plaster cast for fixation of fragments.

Another case a fracture of the forearm in which both bones were fractured in the lower third (Fig 4 *A*) Reduction was accomplished by the use of a lever on both bones The arm secured so firm that as soon as the cast was set the levers were removed and the fragments remained intact (Fig 4 *B*) A perfect result followed

We have seldom found it necessary to use this method in fresh fractures of the femur but have had occasion to apply it mostly in old unsuccessfully treated fractures having shortening and deformity These may by manipulation or by osteotomy be rebroken at site of previous fracture and then by fixed traction and direct leverage be brought into proper position The case of a 5 year old child will illustrate my procedure

He had a fracture of the middle third of the femur three weeks before he came to us He had treatment had one or two attempts at reduction and efforts to reduce the fracture followed by Buck extension He had on admission which showed shortening which was greater than desirable for a child of 5 years (Fig 5 *A*) Manipulation and fixed traction brought fulness of the limb and a desirable specimen was applied X ray however showed that although the fragments were of full length they were not in apposition and alignment (Fig 5 *B*) He was placed on the fracture table gas administered and was made deeply to the fragments and perfect apposition was accomplished The lever was fixed in the plaster over the window cut in the cast (Fig 7 *B*) The child had an uneventful recovery and a desirable result followed

Another instance where a slightly different technique was used was the case of a man who a few weeks before had fractured his thigh in the middle third with slightly over an inch shortening but a marked deformity (Fig 8 *A*)

He was placed on a fracture table and through a small incision osteotomy was performed During this procedure the outer side of the shaft was broken off In this instance we used a long forceps inserted into the medullary canal of the lower fragment as a lever On account of the callus and position of the upper fragment it was necessary to use another forceps inserted into this fragment The use of this double lever was suggested by my associate Dr H W Orr With a lever in both fragments reduction was accomplished (Fig 8 *B*) The forceps were embedded in the cast for fixation purposes and removed in 10 days without complication and a most satisfactory result followed

Personal deductions

1 So far in the use of this method in the reduction of fractures we have had no complications and our results have been uniformally pleasing

2 Many fractures which are apparently irreducible can by this simple method of direct leverage be perfectly reduced with a minimum danger of infection and damage to the soft tissues

3 The embedding of the lever in the plaster of Paris cast after reduction has been accomplished insures adequate fixation of the fractured fragments

SOME QUESTIONS RELATING TO SURGICAL DRAINAGE OF THE PERITONEUM

By ROBERT LEE PAYNE M.D. F.A.C.S. [illegible]
[illegible]

In the surgery of intra abdominal lesions complicated by contamination or infection the operator is most frequently uncertain whether to provide for an extra abdominal outlet through some form of drainage or to close the wound tightly. The recent literature has been full of positive dictatorial almost calling for the adoption of the dictum when in doubt to drain. Unfortunately for many patients this dictum set forth by experienced men has resulted in serious complication or death when carried out by inexperienced operators and it seems to the writer that the enthusiasm of some skilled operators who close the peritoneum without drainage is calculated to stimulate a premature surgical judgment into action of commission that will in most instances militate against the welfare of the patient.

This then is the cause I wish to plead before you and the whole question must hinge on the first premise namely that the peritoneum as a tissue lining the intra abdominal cavity cannot be trusted or does not train in the general acceptance of the term.

Yates experiments in some of which I had the opportunity to assist proved conclusively that gauze rubber and glass tubes when introduced into the normal peritoneal cavity were completely enmeshed or covered with a dense layer of fibrin within a period of 4 hours and entirely impervious to fluid. What is true of normal peritoneum is true to a lesser degree of injured peritoneum and the failure to recognize this difference lies at the bottom of the practice of many surgeons who close contaminated and infected areas of the peritoneum without drainage. We must recognize that infected peritoneal tissue has much less resistance to injury than normal or than normal peritoneum can annihilate many more bacteria without support. We must also recognize that an injured area of peritoneum can be drained but the so called drainage must be simple in the nature of an outlet or pathway of less resistance from a point in the local area and not the general cavity as by the latter a true abdominal fistula can follow.

In a local area of contamination or infection it is certain that a part of the omentum becomes walled off from the general cavity by plastic lymph and fibrin in a period of time varying from a few hours to 24 hours thus representing the mechanical defensive mechanism of the tissue. There is also a biological defensive mechanism active at the same time consisting first of a powerful absorptive power and secondly the ability of the peritoneum under altered physiological condition to pass large amounts of transudate or exudate. This latter process is spoken of by some writers. Hensley in particular as a reversal of the lymphatic circulation but the writer is inclined to the interpretation that the condition is analogous to the biological principles of an inflammation namely a slowing of the currents in the local blood and lymph channels a dilatation of the vessel wall and an outpouring of their fluid content rich in phagocytic cells.

Since peritoneal infection spreads by continuity in the beginning it is rational to assume that proper drainage of these inflamed or injured areas not only acts for a while in the biological defensive mechanism but also provides a pathway of least resistance for the products of bacterial growth. What then is a safe practice to be followed with regard to drainage of the peritoneum when injured by contamination or infection? This I believe can be answered only by a wide experience a well developed and keen evaluation of the local living pathology and not by a universal dictum of "when in doubt" or "do not drain."

The old maxim that more understanding can be acquired through the sense of vision than through all the other senses combined must rely be applied to the interpretation of living pathology in the peritoneal cavity. The pull of drainage is an individual one predicated on the operator's conception of the infective status of the area cannot be instituted or omitted by any rule of thumb and is always open to the varied states of the peritoneum seen in the degrees of infection having varying degrees of virulence pattern of variable resistance and deserving different periods of time from the rest of a task. How then are we going to evaluate the truth of these statements which briefly state the reasons for drainage in the infected and contaminated peritoneum? From the experience we have existed and have always [illegible] healed and we did not take to drainage if the

[illegible]

peritoneal cavity is contra indicated May we not justly ask what of the majority of peritoneal infections which are definitely local in their in ception? Most assuredly all local infections of the peritoneum do not result in local abscesses What will we do with those virulent types of early peritonitis always local in the beginning that soon progress by continuity to a wider area of encroachment? Would not a proper drain to the ource of such an infection provide a pathway of least resistance and also augment the inherent defensive mechanism of the peritoneum both mechanical and biological?

Another editor of one of our journals states We have learned that we cannot successfully drain for any inadvertent contamination of clean peritoneal surface that may take place in an operation whether the contamination be from open gut or from contact with actual pus If this were true then we need no longer fear the susceptibility of the mesentery in small gut re sections nor the widely recognized danger of peritonitis in colon resections In contamination we do not know the character of the organisms or the tissue changes produced by them Hence in soiling normal peritoneum a provisional or pre cautionary drain should always be used When in doubt always drain for 4 hours

Many surgeons are omitting drainage in cases of gangrenous appendicitis with associated but distinctly local peritonitis The fallacy of this practice become all the more apparent when we are reminded of the fact that the veins from the appendix drain directly to the portal and recall the number of cases of fatal pylephlebitis reported in the literature following the removal of a gan grenous appendix The peritoneum will not drain but in these cases the local area can be afforded a pathway of least resistance

Wilensky and Berg[1] attempt the practical cri terion of taking direct smears from the infected peritoneal surface counting the greatest number of organisms per field and claiming that one organism in four or five is compatible with closure without drainage Their deductions are based on the study of 21 cases As against this optimism Rulison[2] reports on the bacteriological study of 189 cases of peritonitis and concludes that the type of organisms recovered at operation does not eem to furnish any information of prognostic value and that various symbioses were found alike in both mild and severe grades of peritonitis

The many characteristic ti sue changes in the peritoneum produced by various bacteria are never the immediate cause of death but this cannot be said of the toxins elaborated by the infection Thus we peak of the virulence of certain bacteria but we have no means of measur ing an individual s susceptibility MacCallum says the outcome of peritoneal infection is de pendent on the balance between power of resist ance and the virulence of the bacteria Given a patient already showing the effects of bacterial invasion can we estimate just how much more additional toxin the victim can resist without further harmful results? It is in just this posi tion when in doubt that some experienced surgeons are advocating closure without drainage and while it is well to record the results in these cases yet it seems to be a dangerous teaching for universal acceptance In the majority of these infections a proper drain to the definitely local source of infection will usually in the first 24 hours provide a pathway of least resistance for a certain amount of toxin that could possibly prove lethal if retained One fatality in no matter how large a eries of cases is sufficient to condemn the adoption of the principle when in doubt do not drain The mission of the operator is definite and we have no license to cap italize our operating room doubts and then gamble with them against a human life

A word regarding drainage in diffuse peritonitis We must always be mindful that the experiments of Yates substantiated a hundred fold by others have proved that the general peritoneal cavity cannot be drained that adhesions by fibrin com pletely isolate a drained point from the remaining cavity in a limited number of hours and that the source of the infection is the only problem with which the surgeon can in any way deal There fore the practice of draining low points of the abdomen for injured areas higher up is unsound and all necropsies following death from general peritonitis witnessed by the writer have always shown the drained area isolated by adhesions with always an equal surrounding peritoneal reaction of diffuse inflammation Proper drainage then of the primary source of infection is all that is necessary The remaining peritoneal tissue had best be left to its natural defen ive forces

The treatment of peritoniti then resolves into fir t removal of the source of the infection and second the prevention of the spread of infection In carrying out the second phase of treatment we have at present nothing to rely upon but the institution of proper drainage This procedure operates by making for the source or infected area a safe pathway or outlet in the direction of least resistance Adhesions isolating the infected area

plus resistance local and general are the patient's salvation We know that drains augment the formation of adhesions by stimulating the mechanical defensive mechanism thus we may properly conclude that the prevention of the spread of infection in peritonitis is augmented by making the area extraperitoneal and this result is partly attained through the use of proper drainage It is universal surgical knowledge that the peritoneum must have time to mass her protective forces In acute infections with and without soiling we have as yet no definite standards concerning the exciting organisms or the pathology present the protective forces have not had time to indicate how well the tissues will be cared for in the fight therefore closure without a precautionary outlet or lead by proper drainage is taking a chance that should not be condoned

The principles outlined herein have been strictly adhered to by me during the past 18 years and the results may be summarized through the analysis of a consecutive series of cases operated upon during the 10 year period ending November 1 1923 The most common cause of peritonitis is infection beginning in the appendix

In St Vincent's Hospital during the period mentioned the writer has operated upon 1 203 patients following a diagnosis of appendiceal infection in one form or another In 940 of these cases the pathology was interpreted as being confined strictly to the appendix and its mesentery and all were closed without drainage In 263 patients there was recorded a postoperative diagnosis of peritonitis local or diffuse in one form or another and all of this type were drained The muscle splitting or gridiron incision was used *in all but* 3 cases and special stress was laid upon confining the operative manipulations strictly to the original focus of infection The type of drain commonly known as the cigarette consisting of gauze rolled in rubber tissue or rubber tissue alone was used exclusively in all cases and the drain was placed at the source of infection only When the coils of bowel inhibited on the drain so that its course became tortuous then two or three were sometimes used in order that a straight free outlet or pathway along the lines of least resistance might be afforded the products of infection The drain was always lifted about 1 inch at the end of the first 24 hours When beginning of tissue or fecal fistula occurred the drains were replaced by clean ones All drains were removed completely when secretions diminished to a small area of staining on the dressings or the amount came to a standstill Gentle irrigation under very low pressure through a small soft catheter was used around the drain in the case having thick solid discharges

We believe that drainage takes place along the sides and about rather than through the agent used The principle involved was to provide and maintain an outlet for the proper period of time Draining agents that are soft and flexible are less liable to make pressure along their course *therefore the cigarette type we consider preferable* to tubes having a more rigid character

In the 263 cases of peritonitis there was found at operation localized peritonitis (varying from the mild fibrinous type to abscesses gangrene of the bowel leakage and soiling present in 209 cases) Five of this type died The average duration of hospital stay in these cases was 21 days and the mortality rate was 2 3 per cent In the *remaining* 54 cases there was found at operation a general diffuse suppurative peritonitis 38 of these cases or 70 3 per cent recovered with an average hospital stay of 31 5 days while 16 died giving a 29 6 per cent mortality The life after operation of the total 16 cases who died was an average of 4 8 days while a selected 11 cases from the same group live only 1 hour after operation The mortality in the total of 63 cases of peritonitis local and general all drained locally at the source of infection was 6 per cent

The question of surgical drainage of the peritoneum must remain to a certain extent an open one and dependent on the living pathology and *other conditions present in the individual case* When all surgeons either of one hospital group or everywhere have acquired a like experience in peritoneal infections then we may formulate definite standards to follow with regard to drainage Situations of doubt must necessarily arise and when these occur the writer believes it is safest to be the argument follow the dictum of Lawson Tait When in doubt drain

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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SEPTEMBER 1924

ACUTE INTUSSUSCEPTION

ACUTE intussusception is a very common condition but it seems to occur in a rather sporadic fashion Apart from cases of external strangulated hernia acute intussusception has accounted for about one third of all the cases of acute intestinal obstruction that I have encountered

During my service in the Meath Hospital for 10 years I had on an average four cases each year—my colleagues there during the same period had only about 10 cases between them Since I transferred my services to Sir Patrick Dun's Hospital 15 months ago I have not seen a case while my successor at the Meath Hospital has had 5 or 6 cases—indeed he had two cases in one week

The localities are very similar There is a Lying in Hospital in each area and the people seem to be as prolific in the one area as in the other if one is to judge by the number of young children one sees in the streets The class is much the same and I assume the food is not different Possibly the practitioners in one area are more conversant with the signs of the condition than those in the other area and recognize the trouble more readily

The condition is met with most frequently in infants between the ages of 2½ months and 10 or 12 months—my youngest case occurred in an infant of 2½ months It is occasionally met with (but with diminishing frequency) at all ages up to 70 or more My oldest case occurred in a woman of 73 years

The evidences in an infant are so typical that one has only to see one case or hear the phenomena described in order to be able to make a correct diagnosis and that too within a few hours after the onset

An infant in perfect health—perhaps jumping with delight in its nurse's arms—is suddenly seized with a severe fit of crying—screaming in an agonized fashion would better describe it—which lasts for several minutes and then gradually dies away It kicks its legs as it screams and a cold clammy perspiration collects on its face or pours off it At the same time its face is pale and thus it is distinguished from the face of an infant merely crying from a fit of temper as the latter's face will be flushed and certainly will not be bathed in *perspiration* *The fit of* screaming dies away and is followed by a stage of exhaustion *during which the infant* merely gives an occasional moan Soon—10 *to 30 minutes*—the paroxysm of screaming is repeated and the child vomits—indeed it *may have done* so during the first attack—flatus is passed and there will be a bowel *evacuation* Another stage of exhaustion for a varying period is followed by another paroxysm of crying (perhaps vomiting if the infant has had anything to drink) further passage of flatus and perhaps another movement of the bowels

Paroxysms of crying vomiting passage of flatus and motions followed by exhaustion alternate for 6 to 12 hours when blood and mucus will be passed per rectum The paroxysms of pain are of course due to violent peristalsis and it is during such a paroxysm that one can readily feel the typical sausage shaped tumor as the violent peristalsis makes it more marked

The infant must take a deep inspiration in order to continue its crying which is merely a forced expiratory effort During the inspiration its abdominal wall will become relaxed and the surgeon's hand will then readily detect the tumor The right iliac fossa may also seem empty as by that time the cæcum and ascending colon may have passed down to the transverse colon or further I have twice seen the intussusceptum protruding through the anus and yet the intussusception was subsequently completely reduced and both patients recovered

In my experience the intussusception starts most frequently in the ileum about 1 or 1½ inches above the ileocæcal junction but directly the involuted ileum reaches the ileocæcal valve the cæcum then becomes intussuscepted thereby forming a double or compound intussusception

The dimple which is always seen on the intestinal wall at the site at which the intussusception starts after reduction has been effected has been found by me to be situated most frequently about 1 or 1½ inches above the ileocæcal junction

I believe the symptoms are more severe in that type from the beginning as the circulation is more interfered with

If one has any doubt as to the diagnosis examination per rectum with the index finger of the right hand and with the left hand on the abdominal wall—if necessary under an anæsthetic—will clear up any doubt It is possible in an infant thus to palpate the entire abdominal cavity from the liver and spleen downward The woman of 73 years upon whom I operated was sent into hospital as a case of prolapse of the rectum which a doctor stated he had reduced three times *during the previous 4 hours The house surgeon* reduced it on admission and informed me of the facts on my arrival soon afterward Hearing the history I thought it advisable to make a rectal examination (I might here mention that examining a patient per rectum does not always mean getting to the bottom of the disease) when I found the typical os uteri condition about 4 inches up On opening the abdomen directly afterward the intussusception was found to have started in the pelvic colon and was easily reduced but in order to diminish the risk of recurrence until œdema and congestion of the gut had subsided and especially at the site of involution I had a tube passed through the bowel from below which I anchored with a fine catgut suture about inches above the site of involution The result was most satisfactory

I have only seen one condition which might be mistaken for intussusception on account of the abdominal pain vomiting and passage of blood per rectum viz Henoch's purpura but the patient is generally older viz—3 or 4 years or upward and purpuric spots will be seen—sometimes like flea bites over its legs arms or abdomen

The diagnosis of intussusception once made the only satisfactory method of treatment consists in early operation and reduction by gentle expression from below upward Care should be taken to see that the least dimple at the site of commencement of the intussusception is expressed I have not seen any case recur after operation My own mortality has been 3 deaths in 79 case In two of these cases resection had to be performed while the

third death took place from convulsions on the tenth day after operation when the abdominal wound was soundly healed and the child was considered fit to be taken home

For some years past I have sent these cases home a few hours after they have recovered from the effects of the anæsthetic The mother reports daily to the hospital as to the infant s progress or a student visits the case and reports to me

I believe that this condition is one which requires greater gentleness in manipulation and greater rapidity in operating if success is to be uniformly attained than almost any other intra abdominal trouble Given an average case of less than 24 hours duration I think the completed operation should not require more than 10 or 11 minutes to perform

Early diagnosis and early operative interference will reduce the mortality from the figure at which it is generally recognized to stand today to less than 5 per cent

Sir William Taylor

THE TECHNIQUE OF THE TONSIL OPERATION

SINCE Tydings first described tonsillectomy in contradistinction to tonsillotomy a little more than 10 years ago many and varied methods have been advocated for the surgical removal of the faucial tonsil Formerly the tonsil was operated on only when it was so large that it was thought to interfere with deglutition breathing and phonation Since the work of Billings on focal infection has become known the tonsil has assumed a far more important rôle in its relation to the general welfare of the patient That it is an organ of importance in present day medical and surgical practice needs no argument Certain advocates however may be said to be enthusiastic

Because the faucial tonsil has proved to be an important portal of entry for infection it has been necessary to devise a safe complete and surgically sound method for its removal which does not disturb the function of the oropharynx Numerous procedures have been suggested and in all probability there are as many good methods of removing the tonsil as there are good operators on the tonsil This statement implies that the principles of good surgery are followed but that naturally individual adaptation of perhaps several suggested method are combined in the hands of the surgeon

In general it may be said that operations on the tonsil are now being well done Certain surgeons advocate local anæsthesia and others will not perform the operation without general anæsthesia Here again it seems to be only a matter of choice with the surgeon for there are surgeons whose temperament does not permit them to perform the operation under local anæsthesia

The spectacular grandstand operation on the tonsils is no longer regarded with favor Present day sentiment demands that the operator shall control the bleeding in a surgical manner during the operation that the operation shall be performed in a hospital and that the patient shall be observed until there is no longer any danger of secondary bleeding From time to time bloodless tonsillectomies are described In a certain number of cases with any operative technique there will be little or no primary bleeding Usually primary bleeding in tonsillectomy is due not to the particular technique employed but to the number and size of the blood vessels in the throat being operated on The procedure is not a minor operation although the mortality considering the number of operations that are performed is low

H I Lillie

MASTER SURGEONS OF AMERICA

HENRY B SANDS

DR HENRY B SANDS a native of New York City whose life span extended from 1830 to 1888 occupied a pre eminent place in American Surgery during an epoch of wonderful surgical development and he added much to surgical progress in this remarkable period

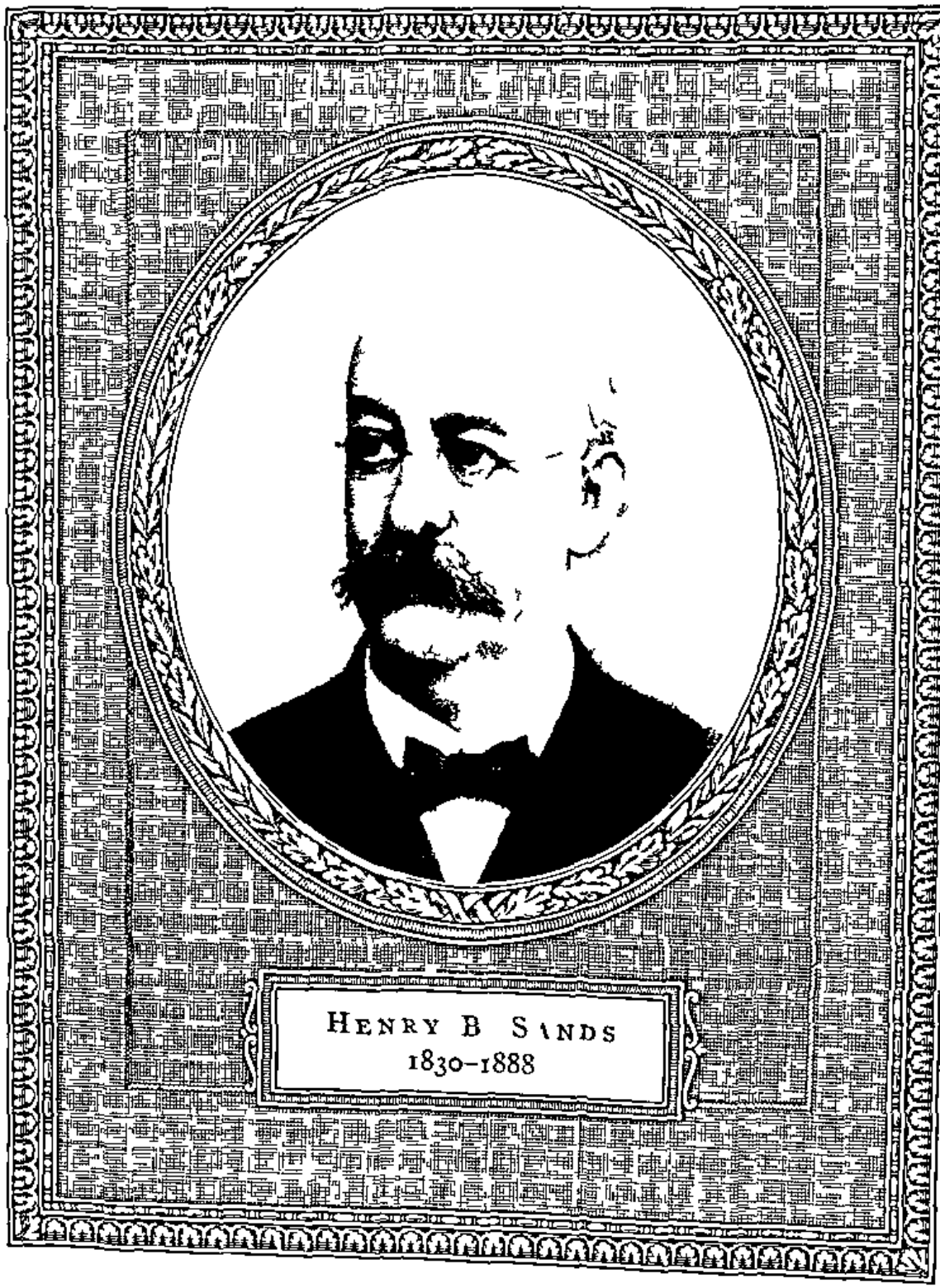
He was educated in the schools of his city and was graduated from the College of Physicians and Surgeons in 1854 served his internesship in Bellevue Hospital and then studied in Europe according to the custom of his time For ten years he was a member of the eminent group of men whom Dr Willard Parker gathered about him

He was demonstrator of anatomy in the College of Physicians and Surgeons from 1854 to 1867 professor of anatomy from 1867 to 1879 and professor of surgery from 1879 to 1888 He was visiting surgeon to many hospitals Bellevue Charity Mt Sinai St Luke s the New York Hospital and the Roosevelt Hospital He appreciated the disadvantages of the short terms of hospital service then in vogue and finally obtained a continuous active service of more than 7 bed at the Roosevelt Hospital

This was a notable service one of the very best in the country He gathered about him a particularly capable group of associates and assistants and maintained a model hospital organization William H Halsted Frank Hartley *Richard Hall and George Woolsey were among the surgeons whom he trained* during this period Many visitors came to his clinic I well remember hearing Dr William J Mayo tell of going into the ward with Dr Sands to see him aspirate an appendiceal abscess—a procedure which made a profound impression on Dr Mayo and led him to treat radically similar conditions after his return home

As a consultant his judicial attitude his great experience his courage his fairness and wisdom and his warm and appreciative nature made him the leading surgical authority of our city for many years In this capacity Dr Arpad Gerster states in his delightful memoirs that he was a man according to my own heart and that he never knew a man who had more of what is called the courage of convictions

As a surgical investigator and writer he considered many and diverse problems hæmorrhage from the internal carotid artery aneurism of the subclavian artery



HENRY B SANDS
1830–1888

nasopharyngeal polypi tracheotomy laryngectomy excision of cords of the brachial plexus internal œsophagotomy intussusception perityphlitis peritonitis various forms of urethral lesions and rupture of veins

His most notable contribution to surgery was in the study of what we now call appendicitis It is difficult for present day surgeons to realize the problems of our surgical forefathers with regard to this disease The pathological process existed then as it does now but it had been studied late either at autopsy after fatal general peritonitis had resulted or at operation after so called perityphlitic abscesses had formed Hence strangely enough attention had been centered on the head of the colon and not on the appendix

The secret of the real pathology was only hidden by the thickness of the abdominal wall but the fear of penetrating the peritoneum prevented early operation Dr Sands however reasoned out the pathology and then did an operation which at that time seemed early He had long been familiar with the work of Willard Parker who in 1856 had introduced a definite line of procedure in the treatment of perityphlitic abscesses and in 1880 Sands wrote a valuable article on the subject and gave histories of 15 cases About 7 years later he stated that he had observed a large number of additional cases and announced his belief that the appendix was really the offending organ As evidence of this he cited the existence of appendiceal concretions in perityphlitic abscesses and also stated that the attacks of pain in perityphlitis varied in their position much as the appendix varies in its position

With these observations in mind he was called by Dr Baruch on December 30 1887 to see a case of acute peritonitis localized in the region of the perforated appendix He saw the case 45 hours after the onset of symptoms advised immediate laparotomy and performed the operation 3 hours later The appendix had ruptured at its base three concretions lay outside the place of rupture and local peritonitis was present He closed the opening drained the local abscess and the patient recovered In reporting this case to the New York Surgical Society on February 8 1888 he stated that he believed that it was the first instance in which an early operation had been done for localized peritonitis due to a perforation of the vermiform appendix in which the operation had ended in recovery and substantiated this belief by referring to Weir s recent tabulation of *operations for perforating lesions of the intestine*

The publication of this case by Sands proved a tremendous incentive to prompt operation in cases of so called perityphlitis which were as common then as cases of appendicitis are now If Sands could cure a case by an operation at a time which then seemed early other operators believed that they could do the same and McBurney Bull and others immediately followed his example The pathology was found to be as Sands had stated it The word appendicitis was coined and the modern conception of the disease was promptly accepted In

thinking of Sands work we must grant him much credit for this farsighted and courageous development

Besides his professional ability Sand was a man of many interests He was a musician of considerable ability and a great lover of music Even at the time of his death which occurred suddenly in his carriage he was returning to his home to an orchestral concert which was to be given there He was interested in the arts He had hosts of friends He traveled much He was a genial companion a gifted conversationalist witty generous and altogether delightful

CHARLES N DOWD

CORRESPONDENCE

PREVENTION OF SUBUNGUAL HÆMATOMA

To the Editor Dr Guillermo Bosch Arana in an article published in SURGERY GYNECOLOGY AND OBSTETRICS for May 1924 has given us a beautifully detailed technique for treating chronic subungual hæmatoma I wish to describe here a simple little procedure which if employed by everyone who banged his finger nail with a hammer would leave Dr Arana with no subungual hæmatomata to treat

The hæmatoma beneath a nail is due of course to the escape of blood from traumatically ruptured capillaries The blood escapes between the relatively soft tissue of the nail bed and the cornified layer or nail proper the hæmatoma dissecting these structures apart as it spreads Pain aside from the pain of the trauma its self is due to the pressure of the clot and the œdema following the injury

Most people receiving a blow or severe squeeze on a finger nail either shake the finger with a vigorous snapping motion swinging the arm violently as we direct a patient to do when we want him to fill his veins so that we can find one to puncture or with the other hand they grasp the finger or thumb just back of the nail and squeeze hard Both manuevers are calculated to cause increased congestion and subungual bleeding and simply make matters worse

The proper thing to do when the nail is traumatized is to grasp it instantly between the fore finger and thumb of the opposite hand the ball of the thumb exactly over the contused area and squeeze with firm even pressure maintaining this pressure for from 10 to 15 minutes *by the clock* The extravasation of blood from the ruptured capillaries into the contused tissue is thus prevented At the end of 10 or 15 minutes the ruptured capillaries will have sealed themselves with tiny microscopic clots and the pressure on the nail may be released Meanwhile the pressure will also have prevented the intercellular extravasation of serum and lymph which grossly constitutes the œdema of a traumatized tissue So there is very much less swelling as well as an absence of gross visible hæmorrhage Lastly the pressure does help control the immediate pain The end result is a very moderately sore finger from which all tenderness will have disappeared in a few days and in place of an ugly and possibly painful hæmatoma there is at worst a very faint staining of the base of the nail I have had several opportunities to test this out upon myself So far it has worked well each time

When the man with a hæmatoma consults you it is a splendid time to describe the little trick to him so that he will remember it and the chances are he will prevent the next one

WILLIAM L ROSS JR B Sc M D
Omaha Nebraska

ATTENTION FORMLR ILLINOIS DOCTORS ATTENTION

To The Editor Will any and all doctors former residents of Illinois or descendants of pioneer physicians of the Illinois country communicate at once with the Committee on Medical History Illinois State Medical Society 644 North Campbell Avenue Chicago Illinois?

Under the sponsorship of the Illinois State Medical Society there is in preparation a *History of Medical Practice in the State of Illinois* that must go to the printer at an early date All possible assistance is asked from every source as to personal data and experiences including diaries photographs and similar documentary mementoes of pioneer Illinois doctors and of progressive phases of medical practice as well as of achievements in fields other than those of medical science Prompt return in good condition is promised for anything loaned the committee the personnel of which is

O B Will M D Peoria
C B *Johnson* M D *Champaign*
Carl E Black M D Jacksonville
George A *Dicus* M D Streator
George H Weaver M D Wilmette Ill
James H Hutton M D Chicago
Charles J Whalen M D Chicago – Chairman

The scope of the volume will range from the discovery of *Illinois* to modern times Through this period of over 250 years there is much of thrilling interest to be detailed Collection of the human interest data can come only from the families or closest friends of the pioneers many of whom long ago removed to distant sections of the United States Photographs especially are desired Also *copies of letters* statements of cures and new methods diaries and the like

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD APRIL 18 1924 DR CHARLES S BACON PRESIDING

TWO CASES OF SPLENOMEGALY AND PREGNANCY

DR EDWARD ALLEN I wish to report two cases of splenomegaly and pregnancy Because of the seriousness of the complications and the fatal termination in one case we think they should be reported in full

At present there is much diversity of opinion as to the classification of splenomegalies Some authors place all of them under the general heading of lymphocytomata making only two subdivisions the leukæmic and the aleukæmic Others hold to the older classifications Gaucher's disease or large celled splenomegaly splenic anæmia or Banti's disease von Jaksch's disease and the hæmolytic or chronic jaundice

In going over the literature I have been unable to find a case report of pregnancy complicated with splenic anæmia

The first patient age 17 years entered the hospital April 18 1917 with history as follows Two years before during a physical examination a doctor found a small abdominal tumor in the left side Since that time there has been a gradual increase in the size of the tumor associated with mild abdominal discomfort At this time the blood count was leucocytes 6 200 hæmoglobin 65 per cent Unfortunately there is no record of red or differential count although the attending surgeon says they were made and a diagnosis of splenic anæmia arrived at There was no lymphadenopathy At operation the spleen with a small accessory spleen was removed Both together weighed 700 grams (The normal spleen weighs between 125 and 175 grams) The patient made an uneventful recovery

She re-entered the hospital on April 26 1922 for a gastro intestinal disturbance and was discharged May 16 1922 with a diagnosis of irritable colon and pregnancy Her last period was February 4 1922 The blood count at this time was erythrocytes 3 600 000 leucocytes 19 400 hæmoglobin 58 per cent The red cells showed anisocytosis poikilocytosis microcytes macrocytes normocytes The differential count was mononuclears 4 large lymphocytes transitional cells 1 neutrophile polymorphonuclears 81 basophile polymorphonuclears 1 neutrophile myelocytes 11 The myelocytes in this case can best be explained by the work of Pearce Krumbhaar and Frazier in which they found that several animals out of a series of splenectomized dogs developed subsequent myelocytosis

The patient went through an uneventful pregnancy except for slight gastro intestinal upsets She re entered the hospital November 19 1922 in active labor Pains began 8 hours before but were still irregular and weak When we saw her pains were only every half hour and 3 minims of pituitrin were given without appreciable effect Two hours later with the cervix well effaced and the os about one quarter dilated the membranes were ruptured artificially further to stimulate pains Pains became a little stronger but at 9 30 a m 3 minims more of pituitrin were given to increase the effectiveness One half hour later the head came down to the perineum Cervix could still be felt but dilatation was almost complete The cervix was slipped over the head during a pain by Dr Heaney and low forceps applied One ampul of pituitrin was given as soon as application was completed because in her condition postpartum hæmorrhage was feared A normal female infant was delivered in good condition The placenta did not separate and was removed manually It was adherent over about three quarters of its surface The duration of labor was 16 hours No lacerations of the cervix were present but as the cervix was being inspected the patient suddenly became cyanotic took a few gasping respirations and died on the table Postmortem was not allowed by the family Delivery was done under gas-oxygen ether anæsthesia At no time during our period of observation did the patient have any evidence of lymphadenopathy icterus or ascites

Second Case The patient age 28 was admitted to the surgical division of the Presbyterian Hospital August 14 1922 complaining of evening rise in temperature and a tumor mass in the abdomen which had caused a noticeable increase in the waistline for the last month On physical examination there was no adenopathy A large tumor mass in the region of the left kidney was firm smooth and not tender The blood picture at this time was erythrocytes 4 790 000 leucocytes 7 200 hæmoglobin 80 per cent polymorphonuclears 81 per cent lymphocytes 12 per cent large mononuclears 6 per cent eosinophiles 1 per cent The Wassermann was negative and the blood chemistry normal A possible kidney lesion was diagnosed and laparotomy per

formed August 19 1922 When the abdomen was opened the uterus found an enlarged smooth spleen extending down to four fingers above the iliac crest Recovery was uneventful and the patient was dismissed at the end of 2 weeks She was readmitted October 9 1922 with a blood count as follows erythrocytes 3 030 000 leucocytes 6 000 hæmoglobin 4 per cent The differential count showed no change in the reds small lymphocytes 15 large lymphocytes 12 large mononuclear 4 transitional 8 polymorphonuclear 61 The medical service made a diagnosis of an aleukaemic splenomegaly and began to give her short treatments of X ray The white count taken 4 hours after the X ray treatment was 5000 Examination showed a 3 months pregnancy last period being July 11 The patient had had a previous pregnancy 2 years before which was normal except for a trace of albumin in the urine during the last 4 weeks She had a 8 hour labor right occipitoposterior presentation which was terminated with low forceps There was no hemorrhage The present pregnancy was uneventful except for persistent fatigue The blood pressure and urine were normal She received 3 minute X ray treatments every 3 weeks during the term of pregnancy She presented herself in active labor April 3 1923 and gave birth to a 5 pound 8 ounce baby after hours of labor There were no lacerations The placenta separated spontaneously at the end of 15 minutes came down into the vagina and was delivered normally and was intact The patient had nitrous oxide for the perineal stage She was given an ampule of pituitrin as soon as the placenta was delivered and there seemed to be less than the normal amount of bleeding Two hours after delivery the interne was notified that the patient was bleeding more than normal An ampule of pituitrin and aseptic ergot were injected also a drachm of fluid extract of ergot was given by mouth The bleeding continued and 2 hours later another ampule of aseptic ergot was given Pituitrin was repeated in 1 hour The pulse at this time was 102 Two hours later the patient was still bleeding and the uterus was explored and the wall found clean The uterus was packed with gauze There was no material increase in the bleeding In half an hour the blood began to come through the uterine pack The pulse had risen to 120 The blood count immediately following delivery was erythrocytes 2 000 000 leucocytes 4 000 hæmoglobin 6 per cent The blood pressure was 40 80 The hæmoglobin went down to 50 per cent in the next two hours She was given 40 cubic centimeters of whole blood deep in the muscles of the thigh Another ampule of pituitrin was given Fourteen hours after delivery the blood count was erythrocytes 1 560 000 leucocytes 7 300 hæmoglobin 40 per cent Bleeding was not profuse but continuous so a portion of the pack was removed The next morning the pulse was of a better quality but still 120 30 and the patient seemed very weak At this time the blood count was erythrocytes 1 300 000 leucocytes 8 800 hæmoglobin 35 per cent She was given 125 cubic centimeters of whole blood intravenously with marked reaction The patient went through severe shock developed a marked edema about the lips and throat and looked as though she would not last out the hour Normal salt 450 cubic centimeters was given intravenously and the patient sent back to bed The condition gradually improved and in the afternoon the blood count showed erythrocytes 1 10 000 leucocytes 5 000 hæmoglobin 40 per cent The differential made at this time was lymphocytes 26 transitional 6 polymorphonuclears 62 eosinophiles 2 The patient continued to have a bloody vaginal discharge but no active hemorrhage for several days The blood count went steadily down and until 6 days after delivery when she had erythrocytes 930 000 leucocytes 3 000 hæmoglobin 20 per cent Week after delivery she was given 300 cubic centimeters of whole blood intravenously with very little reaction Temperature went up to 102 6 That evening the blood count was erythrocytes 1 3 0 000 leucocytes 4 000 hæmoglobin 28 per cent One week later she had another blood transfusion and by the next day the blood count had gone up to erythrocytes 2 180 000 leucocytes 3 400 hæmoglobin 43 per cent The differential count at this time showed anisocytosis poikilocytosis no nucleated reds large mononuclear 6 lymphocytes 1 transitional 0 polymorphonuclear 80 myelocytes (?)1 On May 6 1923 the blood count was erythrocytes 3 080 000 leucocytes 5 000 hæmoglobin 65 per cent The patient was discharged May 10 1923 The blood count and differential on the baby were normal The menstrual period began at the end of 3 months normal in amount and with no disturbance Extreme fatigue and a few mild intestinal upsets occurred during the puerperium

The patient re entered the hospital November 2 1923 with the following history last regular period October 12 which was 2 days early the previous period being September 16 and normal The blood count at this time was erythrocytes 3 8 0 000 leucocytes 8 200 hæmoglobin 75 per cent The blood pressure was 110- 0 The differential count was small lymphocytes 22 large lymphocytes 7 transitional 2 polymorphonuclears 0 Vaginal examination showed the uterus enlarged to the size of a six weeks pregnancy An incision was made in the anterior vaginal wall the body of the uterus was pulled forward and the ovum removed by opening across the fundus The uterine ends of the tubes were excised as sterilization seemed indicated in her condition The patient had an uneventful convalescence She re entered the hospital December 22 1923 for splenectomy The spleen was removed with some difficulty due to adhesions along the dome of the diaphragm The spleen weighed 885 grams No lymphadenopathy or liver changes were found The blood at this time showed erythrocytes 4 940 000 leucocytes 7 400 hæmoglobin 70 per cent The blood pressure was 130 70 No differential was made

Microscopic sections of the spleen showed a marked increase in the connective tissue elements with a decrease in the size of the malpighian corpuscles Scattered through the sinuses were many large cells with deeply staining nuclei Diagnosis of splenic anæmia was made by the house pathologist With the exception of a low grade temperature the patient had a good convalescence

INSULIN TREATMENT OF THE TOXEMIC VOMITING OF PREGNANCY

DR WILLIAM THALHIMER read a paper entitled Insulin Treatment of the Extreme Vomiting of Pregnancy (See August issue of this Journal page 237)

DISCUSSION

DR SOLOMON STROUSE I did not want to keep praise on Dr Thalhimer but it is very striking especially to men who have been trying to work in metabolism for a long while that Banting a surgeon discoverer insulin and to have Thalhimer also a surgeon discoverer its use in the vomiting of pregnancy You may not know that Thalhimer announced that he had gotten insulin like substances from the vegetable kingdom especially from the potato before such findings were published Colleagues of the Toronto group

In the first part of the paper I see nothing to criticize and certainly nothing to add The thought has occurred to me that although the kidneys bear the burden in late toxemia the primary derangement may have its seat elsewhere especially in the liver If it is in the liver it might be that insulin properly used might be of help

Regarding Dr Thalhimers theorizing about primary carbohydrate derangement in pregnancy I am going to take the liberty of saying that while the theory is interesting I do not think the facts brought out by Dr Thalhimer are more than suggestive Taking it up point by point he spoke about the early diminution in the alkali reserve as being an indication of derangement of carbohydrate metabolism I do not think this statement is scientifically correct because the diminution in the alkali reserve that occurs in acidosis following derangements of carbohydrate metabolism is quite a late manifestation that is it occurs only when the derangement of carbohydrate metabolism has gone so far as to produce acidosis If a diminution in the alkali reserve exists in pregnancy it would seem to me that it would indicate some other type of primary disease *not due to carbohydrate disturbance*

The second point on which I differ is in regard to the glucose tolerance test Dr Thalhimer knows as well as I do that diminution in glucose tolerance is found in cancer tuberculosis arthritis etc One can hardly infer a *primary* disturbance in carbohydrate metabolism from lowered glucose tolerance

The third point the prolonged acetonuria I think he has overestimated In diabetes after clearing up of the clinical signs of acidosis there is often persistence of acetone Some diabetics will run acetone without any clinical signs of acidosis

The fourth point the early development of the pancreas sounds very interesting Dr Thalhimer justly mentioned that the pancreas develops in the fetus at the third or fourth month and coincidentally at that time the pernicious vomiting of pregnancy appears but the amount of carbohydrates that could be deviated from the normal metabolism by the fetus would be very small and it is hard to conceive of that as being fundamentally at fault

On the whole as interesting as the second part of Dr Thalhimers paper is it seems to me that one should in the light of the fact that we may still be dealing with some unknown intoxication I should like to know why vomiting begins as soon as the ovum is fertilized It has been suggested that a specific protein intoxication may occur If that is true can anyone give statistics on people who are married more than once

DR CARL HENRY DAVIS Milwaukee Wisconsin Relative to the suggestion of Dr Strouse I lost the second wife of a man who had two successive lives of eclampsia The last baby lived and has been perfectly healthy

Dr Thalhimer has through a logical deduction made a real contribution to the management of the very severe vomiting of pregnancy In 1914 Hasselbalch and Gammeltoft reported five gram acidosis before labor which soon disappeared after delivery Emge at the University of California in 1916 demonstrated with the Van Slyke method that practically all pregnant women have a reduced carbon dioxide tension In 1920 I had the blood of women with vomiting of pregnancy examined and all showed a reduced reading The lowest was 28 and a week later this patient aborted I believed the death of the fetus resulted from the acidosis

Most of the cases of pernicious vomiting are apparently due to reflex Unless there are severe complications good results may be expected from the use of glucose solutions and relatively large doses of bromids In the milder cases a 3 per cent glucose containing sodium bromide may be given per rectum The dehydrated requires much larger amounts of fluid than will be absorbed per rectum and the glucose even by gavage intravenously or normal salt solution may be given under the breasts

Dr Thalhimer reports that one of his patients had been given daily doses of morphine before she came to the hospital This I have found is frequently the history in such cases and the treatment also consists in emptying the vomiting The nervous ness is best controlled by bromides

While following the cases treated by Dr Thalhimer I was impressed with the rapidity with which the insulin administration broke the vicious cycle correcting the acidosis and making possible dietetic management Insulin treatment will I believe eliminate the occasional necessity for therapeutic abortion in this type of case

As stated by Dr Thalhimer e u ed gluco e intravenously with in ulin in the treatment of a very severe toxæmia with convul ion which followed an acute cold at 5½ months While this treatment raised the alkali reserve ten points my associat Dr Cron and I feel that the patient s recovery after ome 45 hours of coma was due largely to the use of op ates and continuous lavage of the entire gastro intestinal tract by means of stomach tube and high rectal enemata for a period of about 18 hours The patient was given large doses of mag nesium sulphate an l sodium bicarbonate throu h th stomach tube She was also bled

Dr Charles S Bacon I would ask Dr Thal himer if he has consi lered any of the method of testing out the functional capacity of the liver We have been told that the liver is not the sole but just a very important factor in gluco e metaboli m

Dr N S Heaney I woul l like to ask a question or two Dr Strouse suggested that there might be a doubt in his mind as to whether there is frequently a disturbance of carbohydrate metaboli m in preg nancy The fact that o many cases have persi tent glyco uria which usually disappears as soon as preg nancy is over would seem to leave no doubt regar l ing this

As Dr Thalhimer was talking I trie l to remember whether I ever saw a case of pernicious vomiting which showed sugar in the urine and just from mem ory I would say that I have never seen a case of much nausea in which there was glucose present in the urine Would this coincide with Dr Thal himer s theory of pernicious vomiting?

Dr J L Baer In the unav idable absence of my colleague Dr J Lackner I ant to report a ase I sa with him l t year shortly before he left on vacation It was a typical case of un ontrollable vomiting Dr Lackner had trie l all of the then accepted method of treatment including organo therapy se latives rectal fe ding and the Rehfuss tube method He an l I agreed at the time that un less the vomiting c as l with n 4 hours pregnancy would have to be t rminated which I did He re cently had the same pat ent in the hospital in her second pregnancy starting the ame vicious circle He administer d one dos of insulin and glucose intravenously and the patient is now in excell nt cond tion taking nourishment and going on to a *recovery*

Dr Carey Culbertson Inasmuch as the results in these cases have b en so fa orable it suggests the use of this method in the ordinary nausea and vomit ing of pregnancy I w as going to ask Dr Thalhimer why insul n would not be indicated in the ordinary nausea and vomiting which has not become un controllable or excessive That is one of the *b tes n ures* of ol stetrics as all ph sicians and pregnant women know one of the things that they dread on becoming pregnant having to spend 2 or 3 months w th gastric d stress

I agree with Dr Davis that the so call d uncon trollable vomiti g of pregna ncy is largely due to neglect A patient should not be allowed to vomit but it strikes me that the use of insulin might be app licat l to th ordinary nausea and vomiting of pregnancy

Dr N S Heaney Regarding a suitabl term inasmuch as uncontrollable an l excessive are not atisfactory why not go back to the first term hyp er emesis gravidarum

Dr William Thalhimer, Milwaukee Wisconsin (closing the di cussion) In the admini tration of the insulin we arrange a gravity bottle on a board and al ngside of it have a 10 cubic centimeter burette ith two stopcocks and a Y tube joining the two We fill that apparatus with a olution of glucose We have found it convent nt in the hospital to fasten the apparatus to a board This can be wrapped in a sheet and sterilized in the autoclave and is always immediately available Water seeks its level as soon a the solution is running correctly One stopcock is shut off and the fluid imme iately begins flowing through the burette With the stopcock you can calculate exactly w hat you are giving The fluid in our container flows so slowly w hen the glucose i coming slowly that you can determine th rate We have a number of times given as little as 200 cubic centimeters an hour for a period of 5 hours and checke l it up accurately within 10 or 15 cubic centimeters By this means the solution can be given slowly without embarrassing the circulation The insulin can be given in divided doses so that gluco e is running in after the last dose of insulin Thus the danger of hyperglycæmia from the insulin is diminished Thirty units of insulin are given The glucose is allowed to run in for an hour and then o units of insulin is given followed an hour later by the 10 additional units so that by the first 2 hours of the administration all the insulin the patient is going to get will be given By this method we never have insulin reactions Especially in non diabetic patients insulin shoul l be given very carefully When we start we insi t on having a sterile hypoder mic full of adrenalin in the room so we can give the adrenalin if necessary A hypoglycæmi reaction occurred in one patient who re eived 1000 cubic centimeters of glucose solution and 30 units of in sulin

In answer to Dr Strouse s criticism I would like to say just one word about the changes in the alkali reserve and the effect on glucose metabolism Loevenhart and his co w orkers at the University of Wi consin have definitely demonstrated that you get changes exactly comparable to these vomiting cases if you cut down the oxygen supply You have eliminated glucose you cut down the oxygen supply and the patients *cannot burn it* They develop a diminished alkali reserve and develop a lowered hy drogen ion concentration in the blood which inter feres with carbohydrate metabolism

As for the return of acetone in the urine of these *patients a numb r of* hours after the insulin has been given it is true that when diabetics re rendered sugar free by insulin the acetone disappears and when

you find acetone in these cases you always find sugar Therefore there is undoubtedly some relationship The delayed excretion of acetone will not completely account for that

So far as the amount of carbohydrate that might be needed by the fetus is concerned I think we can only imagine We know for example that glycolysis which is the conversion of glucose into lactic acid in the body occurs quite rapidly As for this tissue growing in the uterus we do not know the amount of glucose which will be needed to nourish it Also we do not know how much glucose is going to be needed to furnish energy for growth We have finished the first stage of an investigation at Columbia Hospital on the effect of insulin on tissue *in vitro* We found when we added insulin to the medium in which these tissues were growing they grew 50 per cent more rapidly than when insulin was not present also that the amount of glucose which is used up in that medium is in some instances three times as much Where we have small specks of tissue the size of a head of a pin we used up enough glucose from our medium so that we could detect it with the blood sugar method In that way we are trying to find out something additional about the mechanism of insulin

So far we have not tested the functional apacity of the liver I think there might be a question as to whether a satisfactory test for liver function has yet been devised

As for glycosuria of pregnancy and its absence in *the pernicious vomiting* cases as mentioned by Dr Heaney —just exactly what glycosuria of pregnancy means I do not know I think we have demonstrated that the yeast test for glucose is unsatisfactory In some of our pernicious vomiting cases we have had high normal blood sugars The fact that you do not get sugar in the urine with abnormality of the carbohydrate metabolism might indicate that an excessive amount of carbohydrate is produced and that is why there is no change in the amount in the urine

As *far as the ordinary* case of vomiting of pregnancy is concerned we have felt that this work has been at a stage where it had to be tried only in the severe cases If insulin is used I think it should be carefully controlled and that the proper amount of carbohydrate food is given for even a small dose of insulin As far as I have been able to work out almost any individual can stand 5 to 10 units of insulin if given some carbohydrate shortly afterward without there being any serious danger but I should say that the normal patient should be con*trolled in the hospital* where she can be watched and properly nursed And when you once do that you have introduced a psychological factor and you cannot tell which is producing the result Since a great deal has been found out about planning the diet in diabetes and seeing that a proper ratio is established more attention might be paid toward planning the diet of the normal pregnant woman seeing that she gets not too much fat and not too much protein because the amount of protein needed by anybody is very moderate

FIBROIDS IN THE PUERPERIUM

Dr F W Fischmann presented a paper entitled Fibroids in the Puerperium (See p 327)

Dr Rudolph W Holmes Dr Fischmann has presented a most valuable in fact an encyclopedic discussion of the pathological changes of uterine fibroids in the puerperium We must concede the correctness of his presentation of facts but we do not believe that these fibroids occur frequently On the contrary in my experience degenerative changes or influences which work deleteriously to the puerperal woman are of a very negligible frequency

Fibroids of the uterus are of rather common occurrence in the pregnant We frequently are able to palpate small fibroids which increase in size with the advance of gestation and involute with the involution of the uterus Large fibroids on the other hand are of comparative rarity

My first experience with a large fibroid occurred many years ago I saw a primipara of about 20 years of age who had been in labor with a tumor the size of the fetal head filling the pelvis The baby was dead A cesarean section was done The woman absolutely refused any sterilization which might preclude further pregnancies saying that as she had conceived once she could again Within 3 months the tumor was no longer palpable

Again I had a fundal tumor in a patient in labor—this was discoid the size of a dinner plate Some months postpartum I removed her appendix her tumor had contracted to the size of a garden pea

I may sum up my sentiments by saying that a fibroid no matter where it is located is no indication for operation in pregnancy so long as it does not arouse symptoms When complications arise irrespective of the time of pregnancy operation may be indicated If labor the method of attack must be dictated by the location of the tumor If not in relation to the brim usually it may be left and delivery of the child accomplished from below In the puerperium the wise course is to operate immediately if symptoms supervene In their absence delay should be the rule until time proves that involution is not to be realized a removal in the puerperium may spell tense mutilation When removed late a myomectomy may be safe but therchildren

From an obstetric point consideration should be the rule

Dr C W Barrett This case was seen in consultation by me and the fibroid was very apparent Conservatism was decided because it seemed that the patient could not live through an operation at this time

I have seen numbers of cases where fibroids have produced abortion which is followed by suppuration or abscess of the fibroid It is a very common thing to see fibroid suppurate I recall one patient the wife of a doctor in the city who was delivered

of a premature child in the seventh month after which as soon as she was in condition I operated and found a large fibroid which had suppurated In the past year another patient had a fibroid which began to grow rapidly and X ray treatments were used Following the X ray treatments the patient bortel As she continued to have hæmorrhages the uterus was cleaned out with the hope that a better time could be found to do the operation for removal of the fibroid That proved to be true Upon operation we found a fibroid with an abscess inside of it

We occasionally do see fibroids reduce greatly in size but I think if they do disappear it is the exception I think more of them suppurate than disappear

DR CAREY CULBERTSON Just one point struck me as being worthy of comment that is the presence of the tumor along with its degeneration and suppuration and the calcification of a small area We know that calcification of a fibroid depends upon an aseptic state and cannot occur in the presence of suppuration I think that Tarnowsky some years ago made that clear and explained why Therefore my idea is that in this tumor the calcification was already present and did not occur during the puerperium It takes a long time for calcified areas to form and in this tumor the change must have occurred prior to the pregnancy whereas the suppuration was of course the result of infection subsequent to the delivery

I think that as far as the management of fibroids in pregnancy labor and the puerperium is concerned the conclusions laid down by Landau in his very elaborate monograph of ten years ago sum the matter up about as well as has been formulated

DR N S HEANEY I have nothing to add to Dr Fischmann's paper except that I cannot let the paper go by without remarking on the astuteness of the pathologist who was able to tell by microscopical sections of the fibroid that the inflammatory reaction had lasted for only 4 or 5 weeks

DR J L BAER I regret the necessity for criticizing one of the very important conclusions drawn in an otherwise excellent paper namely that a cæsarean section is the proper procedure when a fibroid is discovered in labor I believe that is fundamentally wrong Cæsarean section is indicated only under special circumstances more particularly depending on the position of the fibroid and its bearing on the progress of labor

I regret likewise the necessity for differing very radically from the position of my friend Dr Barrett In my experience fibroids very *uncommonly* suppurate They follow a rather routine course of growth and retrogression and the necessity for interference is unusual rather than usual

DR C E PADDOCK I have had an experience of several thousand obstetrical cases and I never saw but one case with fibroid that came to me late in pregnancy that caused any serious trouble or required an operation I see quite a number of cases of fibroid complicating pregnancy but I never had to operate on a case or do a hysterectomy or any serious operation because of that fibroid

DR MARK T GOLDSTINE I would like to have the essayist elaborate a little more on how the expulsion of the fibroid would cause an inversion of the uterus It is rather unusual for a uterus to invert unless pulled on or pushed on by the forceps

DR E W FISCHMANN (closing the discussion) Dr Holmes has been exceedingly fortunate to have seen all fibroid shrivel up and disappear uneventfully after labor

Dr Baer unquestionably is correct when he stamps the recommendation of cæsarean section and myomectomy for all fibroids complicating labor as radical *But it seems the safest way of avoiding the* unpleasant complications during labor and the sequelæ postpartum

Calcification is most commonly seen in aseptic field as Dr Culbertson well states but it does occur in suppuration mesenteric glands in typhoid and tuberculosis My sections showed the calcified areas to be most common around the areas of fatty degeneration of the myometrium

Dr Heaney's query I must answer with Dr Jaffe's statement that where the calcification occurs in the parenchymatous tissue as here in the myometrium and where many muscle fibers stain fairly well and retain their nuclei in various stages of disintegration the degenerative changes are due to lack of blood supply and are of recent origin

Inversion of the uterus is caused by the contractions of the uterus upon the fibroid within it which acts as a foreign body

I heartily agree with Dr Goldstine that by applying the forceps to the tumor I might have caused inversion But I found the tumor fairly unattached and had inversion occurred I would have replaced *it as did the authors* cited in my paper

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J BROWN MD FACS Omaha Nebraska

THE AUGENDIENST OF GEORGE BARTISCH

THE great advance made in surgery dur ng the early part of the sixteenth century by von Cerss dorff Par and others together with the pro gress in anatomical knowledge for which Vesalius was mainly respons ble naturally stimulated study and observation in branches other than general surgery Because of the prevalence of disease of the eye and the horror of blindnes that organ made a direct appeal to George Bartisch (1535 to about 1606) who describes h mself as citizen oculist cuttin (Schnit) and wound physician of Konigsbrueck near Dresden Bartisch had evidently from the preface of his book made a study of the Bible to locate the passages in v h ch the eye and particularly blindness were mentioned From the Old Testament he got the idea that blindness was a visitation of God for sin From the New Testament he gathered that thi could and should be cured for h paraphrases the miracle of restoring the sight of the blind man (John IX) in an ornamental page preceding the list of testi monials which he submits to the reader Conse quently Bartisch lays great stress upon the moral conduct of both patient and surg on in the care of eye diseases In addition he was impressed with the power of incantation which he used to ward off the interference of evil spirits in his work and fear ful lest others might use incantation again t his patient or himself he employed amulets of various types which the patient should wear Som of these are illustrated and though we may not believe in their efficacy we must admire their beauty of form and arti tic value That Bartisch would choo e amulets of an artistic type i natural for he laid great stress upon the general educ tion of the physician as well as insisting upon the greate t possible tech n cal dexterity and even the use of both hands for he advo ates travel for the phy sic an and also the practice of dra ing and painting It is fair to as sume therefore that he was acqua nted with what was good in art and chose his materials accordingly

Hemmed around by superstition and struggl ng under this handicap Bartisch nevertheless made the greatest advances in ophthalmology that had been made up to his time and put forv ard his methods and results in a book publish d in 1583 under the title of *Ophtl almologieia* that is Eye service— ΟΦΘΑΛΜΟΛΟΓΙΑΕΙΑ Das ist Augen dienst He then goes on to state that the book i a compilation of his o n results in infirmities in juries and diseases of the eye It s dedicated to Augustus Duke of Saxony and the short dedication is followed by a rather lengthy preface in wh ch Bartisch freely states his opinion of the practice of treating eyes of the time and the opinion is far from flattering

Following the preface Bartisch gives several pages of case reports in the form of testimonials vouched for by the patient or relatives The influence of the sp ritual is again shown in the heading of the title to the testimonials which is a reference and transla tion of Matthew IX—12 But when Jesus heard that he said unto them they that be whole need not a phy sician but they that are sick

The first part of the ophthalmology proper consists of a discus ion of the relation of man to the firma ment and the four elements earth air fire and wat er hich he believed had a great influence on the treatment of the eyes Through ut the work he advises oculists to see that the proper astrological formulæ are used in their treatment

The anatomy of the eye is carefully described and both the brain and the eye are illustrated by a series of superimposed plates showing the relations of the various parts to one another In his plate of the muscles he sho s the four r cti but apparently d d not know of the two obliques

The remainder of the volume treats of diagno is and therapy It is beautifully illustrated by wood uts of various pathological conditions operative procedures instruments and amulets Bartisch did not believe in spectacles and though he illustrates them warns against their use preferring to trust in amulets prayers and incantations For squint he uses d fferent forms of masks with holes cut in p oper positi n to make the pat ent bring the eyes to normal position in order to see an i genious procedure but liable to be very uncomfortable in hot weather

Bartisch was also an operator and believed in the use of the seton which he advocated in pannus pterygium entrop on and ectropion and many other conditions He divides cataract into white gray blue green and yellow and needles them and de presses them through the sclerotic

Bartisch was very insistent upon proper after treatment of his operative cases a r ost unusual thing for this time and gives detailed direct ons and prescriptions to be carried ut His work placed him far above other oculists and deserves to be con sidered the greatest work on diseases of the eye pub lished up to his period

In dem Andern Teil wird angezeiget vnd beſchrieben / von den mängeln vnd gebrechen der Augen / ſo angeerbet vnd von Mutter leibe angeboren werden / Als ſchielende / verſchoppte / vnordenliche ſtarre augen / vnd mancherley grobe vnart der Augen / Wie jr eine jeglichen zu helffen / vnd was für ſtücke darzu gehören.



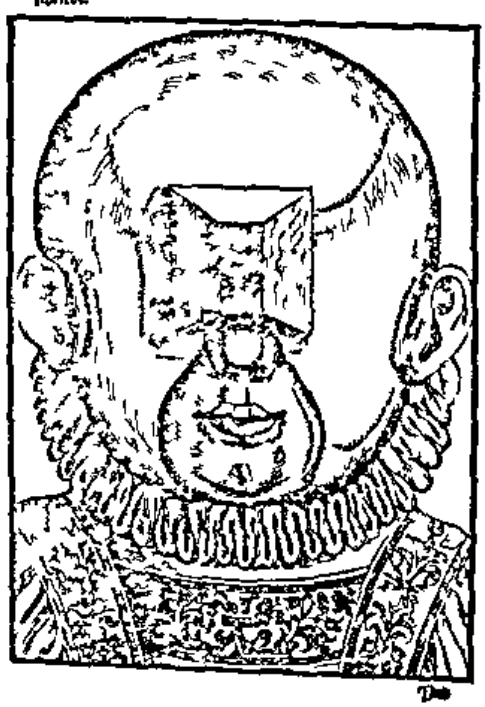
nach dem liecht ſehen / ſtarr / wenden vnd richten müſſe / es ſey bey Tag oder Nacht / oder maſſen / wie dieſe mengel nach / folgende Contrafactur vnd Figur angezeiget vnd angeben.





Derwenden der ein K[illegible] o die Augen auswarts gegen den Ohren oder Schlaff // wan man dem Kinde auch eine ſonderliche Kappe oder Kugel machen / der geſtalt / das für vornen lang herauß gehe / als wan S[illegible] / da ſol man vornen eine kegelſchnitt

ſtarrn haben / darmach das Kind ſehen mehre / wie dieſe nachfolgende Contrafactur zu J gar klar anzeiget / darauß man ſich ſehen vnd zu verſehen iſt / als wenn man drey oder vier Daum breit ſchriebe.



REVIEWS OF NEW BOOKS IN SURGERY

MANY costly mistakes have been made at the outset in organizing and establishing institution for the care of the sick Frequently the efforts of overenthusiastic individuals whose hearts are right are misguided by lack of experience The pitfalls of hospital construction and organization are many

Mr J J Weber's recent book entitled *First Steps in Hospital Organization* will help to avoid many errors The choosing of a proper site balancing of accommodation according to population financing general organization and organization of various departments are all well discussed Mr Weber draws attention to the need for looking well to future requirements—expansion He has pointed out the advisability of selecting at the outset a superintendent of sufficient experience and training so that his advice may be available during the period of construction In the appendices are to be found many important details which are not only helpful but necessary Mr Weber does not leave his readers by simply saying that by laws and agreements of various kind are required but he gives samples of these

Mr Weber's book will fill a great want in the hospital field and will be much appreciated by those who are planning the erection of new institutions

ALLAN CRAIG

THE hospital field will receive with interest profit and appreciation Mr Frank Chapman's book *Hospital Organization and Operation* containing much valuable authoritative data and fundamental principles that can be applied in the administering of hospitals large and small This book crystallizes in a clear and logical manner the ideas of a successful and practical hospital administrator and reflects throughout the well tried experiences of the author

The author at the outset wisely calls attention to the primary functions of a hospital These are well summarized as follows (1) the care of the sick (2) the teaching of disease (3) the study of disease The carrying out of these functions affords the hospital a closely interwoven relationship with the activities of the community The service the hospital renders is however basic As he so aptly puts it One must not lose sight of the fact that a hospital is not an inert thing of brick and stone but is an ideal of service

The importance of well thought out organization and responsibilities is emphasized Just as organization is necessary to industry business or other enterprises so also is it essential to successful hospital administration Indeed the same principles apply in a great measure Accompanying the discussion of organization the author submits a number of explicit charts by way of explanation Mr Chapman emphasizes the importance of giving sound thought to the personnel selected especially the superintendent This is well set forth in the author's own word The keynote of the arch of efficient hospital operation is a properly qualified superintendent He is the person who is charged with the interpretation of policy as laid down by the trustees and the converting of it into wholesome action for the best care of the patient as provided through the well articulated and co-ordinated composite activities of the hospital

The greater portion of the book especially Chapters II to XII inclusive is taken up with the discussion of hospital departments their organization and operation Definite guiding principles are laid down based on the essential theories and practices that indicate for the successful conduct of such departments there must be definite fixed departmental authority with a department head responsible for the activities carried on therein

The author definitely calls attention to the need and value of more uniform methods for recording and accounting generally A need for the standardization of record and accounting forms is expressed Many forms are submitted in the text a number of which are recommended for use in hospitals by the Committee on Forms and Records of the American Hospital Association and others are now being used by the United Hospitals of the City of New York

In Chapter XIII Mr Chapman realizing that the administrator of the small hospital may feel that much of the data in the previous chapters does not apply to the small institution clearly interprets the principles he has laid down into practical application in the smaller hospital administration He readily dispels any feeling that all the idealism and all the mechanism outlined in this volume is fine for the larger hospital but is not applicable in any sense of the word to small hospital development He shows clearly that the same identical principles are applicable in the hospital of ten beds as well as in that of five hundred beds

Chapter XIV presents in a comprehensive graphic and illustrative manner many procedures of operation and a detailed explanation of—admission and discharge of patients professional records billing of patients purchase and issuance accounting analysis of activities This will throw much needed light on some of the more technical problems of hospital administration—professional social financial and statistical

The closing paragraph in well chosen language sets forth the breadth of hospital service and the kind of spirit which should permeate its achievement

FIRST STEPS IN ORGANIZATION HOSPITAL By Joseph J Weber M.A. New York The Macmillan Company 1924

HOSPITAL ORGANIZATION AND OPERATION By Major Frank Chapman Director Mount Sinai Hospital Cleveland Ohio New York The Macmillan Co 1924

The author says in part The hospital in its truest sense is an ideal of service conceived and dedicated to combating disease including within its operation *all the facilities known to human kind for the allevia* tion of suffering M T MacEachern

BERGER S *Principles and Technique of Oral Surgery*[1] is a volume of 450 pages with 355 illustrations devoted to the more common lesions which are seen by the oral surgeon The first chapter reviews the general surgical technique including a number of the more popular drugs and antiseptics

Chapter II deals with examination and diagnosis and is one of the most important portions of the book It seems that it would serve even a better purpose if the pathology underlying the various lesions were included as a comprehension of many signs and symptoms is greatly enhanced if the underlying cellular condition is understood

The general division of inflammations into acute and chronic is timely as it tends to teach routine habit in differential diagnosis thereby simplifying the reasoning which finally leads to the correct diagnosis which is so difficult for the less experienced to acquire

In the author s treatment of necrosis of the bone his conservatism is to be commended as too early removal of sequestra frequently leads to bony deformity which impairs function

Chapter XIII on cysts contains many good illustrations which seem to indicate that their treatment by enucleation is simple thereby inviting the more or less inexperienced operator to attempt them when a complete bony restoration with retention of many teeth could be attained if they were treated after the manner of Partsch

The chapter on alveolectomy might better have been omitted because it seems to give this pernicious practice the stamp of approval In a few selected cases it is indicated and every oral surgeon does the limited operation when it is necessary

The text is clear and concise and is a valuable addition to our literature H A Potts

The Principles and Technique of Oral Surgery By Adolph Berger D D S Lo l Cha d A h S & C Brooklyn N Y rk D t l I ms f I er P bl hin C 3

AN atlas of radiographs[2] is presented in which the makeup and illustrations are excellent The book consists entirely of illustrations with a short descriptive key text embracing the entire normal skeletal anatomy and nearly all of the commoner pathological conditions made up as silhouette radiograms showing the outline of soft tissues as well as of bone

The radiograms are unusually good and are so arranged that normal and pathological illustrations of the same anatomical parts may be compared although the normal structures occupy the first portion of the book the fractures the middle and *the diseased structures the last This is accom* plished by a simple method of placing the normal structures on the left (even numbered pages) and the others on the right (odd numbered pages)

I S Trostler

JOHN MUIR and Sir Archibald Reid are issuing a manual[3] of X ray work with unusually good general makeup text and illustrations Every branch of radiology except therapy is touched upon and the reader is thoroughly introduced to the subject.

The book presents much valuable information for all who are interested in the X rays This is particularly true of that part pertaining to X ray diagnosis which occupying as it does nearly 300 pages constitutes the greater and more valuable portion The subjects are well grouped and there are numerous good comparative tabulations of X ray findings

The plates of the various normal and pathological conditions are above the average except those of the thorax which are nearly all too dark—overexposed—and lack much of fine detail

That portion of the book which refers to X ray protection and protective devices deserves special commendation The book is a valuable addition to any library I S Trostler

A Descriptive Atlas of Radiographic Pathology of the Bones and Joints F S d d P ac rs. By A P Bertwistl M B Ch B X ray k William Wood d Company

A Manual of Practical X Ray Work By J h Muir B Sc M B Ch B B Sc (P b H l h) ll hom so wh C Archibald R id K B E M G M R C S L R C P D M R E (Camb) and J J H low B Sc F I t P A R C Sc 3d d N w Y k P l B Hoeber I

BOOKS RECLIVED

Books rece ed ar acknow ledg d in this department d su h acknowledgm nt must be reg rded as a suff cient t rn for the courtesy of the se de Select s will be made for review in the interest of our readers and as pac permits

PEDIATRICS Vol III By various auth rs Edited by Isaac C Abt M D Phil d lph and Lo don W B Saunders Company 924

TRANSACTIONS OF THE AMERICAN SURGICAL ASSOCIA TION Vol I Edited by John H Jopso M D Ph l delphia W l am J Dorn 923

THE CIRCULATORY DISTURBA CES OF THE EXTREM ITIES INCLUDING GANGRENE VASOMOTOR AND TROPHIC DISORDERS By Leo Buerger M A M D Philadelph a d Lond n W B S unders Compa y 1924

DIE GYNAEKOLOGISCHE OPERATIONSTECHNIK DER SCHU LE ER ST WERTHEIMS Edited by P ofessor Dr Wilhelm Weib l Berlin Julius Sp nger 1923

ATLAS DER OPERATIONS A ATOMIE UND OPERATIONS PATHOLOGIE DER WEIBLICHEN SEXUALORGANE d ed By Dr Wilhelm Liepm nn Berlin Urban & Schw rzen b g 1924

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THE P INCIPLES AND TECHN QUE OF ORAL SURGERY by Adolph B rger D D S Brooklyn N Y Dent l It m of I t st Publ h g Co L d n Cl ud s Ash S s & Co 19 3

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A MANUAL OF GYNECOLOGY AND PELVIC SURGERY FOR S UDENTS AND PRACTITIONERS By Roland E Skeel M D A M M S Ih l delph a P Bl ki ton s Son & C mpa y 9 4

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PLANS FOR THE NEW YORK-BROOKLYN MEETING

THERE will be found in the following pages a preliminary program for the evening meetings of the Fourteenth Annual Session of the Clinical Congress of the American College of Surgeons to be held in New York and Brooklyn October 20 24 1924 It will be noted that the meetings on Monday Tuesday Thursday and Friday evenings are to be held in the Ballroom at the Waldorf Astoria and on Wednesday evening in the Academy of Music in Brooklyn also that programs have been prepared for special meetings on Tuesday and Thursday evenings in the Empire Room at the Waldorf Astoria when papers and discussions will deal with subjects of importance to those interested in the surgical aspects of ophthalmology otology rhinology and laryngology

The preliminary clinical program is being reprinted in this issue This program however is still in a tentative stage and is to be further revised and amplified previous to the meeting so that the final program will fully represent the clinical activities in all departments of surgery in Greater New York The real program of the Congress is to be issued daily during the session and will give in complete detail a description of the clinics and demonstrations to be given at the several hospitals and medical school

The committee in charge of clinics in surgery of the eye ear nose and throat is developing a series of clinical demonstrations to be given each morning at the New York Eye and Ear Infirmary Manhattan Eye Ear and Throat Hospital Bellevue Hospital and other institutions for the benefit of those surgeons who are particularly interested in these branches of surgery to provide them with a full program for each day of the session

An important feature of the clinical program will be found in a series of clinical demonstrations or dry clinics in which surgeons internists pathologists roentgenologists and other specialists will participate to discuss important subjects from all angles bringing to bear the best thought on those subjects as developed by the several departments of medicine

General headquarters for the Congress will be established at the Waldorf Astoria at Thirty fourth Street and Fifth Avenue where practically the entire first floor of the hotel has been reserved for the exclusive use of the Clinical Congress—the Ballroom Astor Gallery Green Myrtle and East Rooms and other large rooms and foyers adjacent thereto These rooms provide ample space for the evening meetings business session registration and ticket bureaus bulletin rooms etc Headquarters will be open for registration at 8 a.m Monday October 20th and each morning thereafter at the same hour

The clinical program Tuesday will be bulletined during Monday afternoon and reservations for clinic tickets for Tuesday's clinics may be filed late that afternoon

An application for reduced railway fares on account of this meeting is pending with the railway passenger associations and it seems assured that a substantial reduction in fares will be granted applying to all portions of the United States and Canada

HOSPITAL CONFERENCE

The annual hospital conference will be held Monday and Tuesday both morning and afternoon in the Ballroom of the Waldorf Astoria It will be noted that the program for this conference which is published in the following pages deals intimately with the detail of hospital standardization and management Addresses demonstrations round table conferences and general discussions by hospital superintendent trustees surgeons nurses and others interested in the conduct of hospitals furnish a program of very great interest and practical value offering solutions for many of the everyday problems and difficulties encountered in hospital management and the care of the patient within the hospital

At the opening session Monday morning Dr Franklin H Martin Director General will make the annual announcement of the hospitals which appear on the approved list for 1924

Headquarters for the hospital standardization department and the hospital service bureau of the College together with the office of Dr M T McEachern Associate Director in charge of hospital standardization activities will be established in the Green Room on the first floor adjacent to general headquarters All those who are particularly interested in hospital problems are requested to register at hospital standardization headquarters upon arrival in New York Such headquarters will be open daily during the entire session

LIMITED ATTENDANCE—ADVANCE REGISTRATION

The rule limiting attendance to a number that can be comfortably accommodated at the clinics must necessarily be strictly enforced at this year's meeting The limit of attendance is based upon

a survey of the amphitheaters lecture rooms and laboratories in the hospitals and medical schools as to their capacity for accommodating visitors This plan necessitates registration in advance on the part of all who wish to attend When the limit of attendance has been reached through advance registration no further applications will be accepted

Attendance at clinics and demonstrations is controlled by means of special tickets which plan has proved an efficient means of providing for the distribution of the visiting surgeons among the several clinics and insures against overcrowding as the number of tickets issued for any clinic is limited to the capacity of the room in which that clinic is given

REGISTRATION FEE

In order that no financial burden may be imposed upon the members of the profession in the city entertaining the Congress a registration fee of $5 00 is required of each surgeon attending the clinical meeting such fees providing the funds with which to meet the expenses of conducting the meeting A formal receipt for the registration fee is issued to each surgeon registering in advance which receipt is to be exchanged for a general admission card upon his registration at headquarters This card which is non transferable must be presented to secure clinic tickets and for admission to the evening meeting

NEW YORK HOTELS AND THEIR RATES

	Minimum Rate for Room with Bath	
	Single	*Double*
Astor Broadway and 44th St	$5 00	$8 00
Belmont Park Ave and 42nd St	6 00	8 00
Biltmore Madison Ave and 43rd St	8 00	12 00
Belleclaire Broadway and 77th St	3 50	6 00
Claridge Broadway and 44th St	3 50	6 00
Colonnade 45 West 13th St	3 50	5 00
Commodore Lexington Ave and 42nd St	5 00	8 00
Gotham Fifth Ave and 55th St	5 00	6 00
Georgian 142 West 35th St	4 50	6 00
Herald Square 16 West 34th St	3 00	5 00
Imperial Broadway and 32nd St	3 00	5 50
Martinique Broadway and 33rd St	3 50	5 00
McAlpin Broadway and 34th St	4 00	6 00
Murray Hill Park Ave and 40th St	4 00	6 00
Park Avenue Park Ave and 32nd St	4 00	5 00
Pennsylvania 7th Ave and 33rd St	4 50	7 00
Plaza Fifth Ave and 59th St	6 00	9 00
Prince George 14 East 28th St	3 00	4 00
Savoy Fifth Ave and 59th St	5 00	7 00
Vanderbilt Park Ave and 34th St	4 00	8 00
Waldorf Astoria Fifth Ave and 34th St	6 00	8 00
Wellington 4 West 33rd St	3 50	5 00
Woodstock 127 West 43rd St	3 50	6 00

HOSPITAL CONFERENCE PROGRAM

BALLROOM WALDORF ASTORIA HOTEL

Morning Session October 9 10 to 12 30

A J OCHSNER M D Chicago President Presiding

Opening Address of the President

Presentation of the Official Report of Hospital Standardization for the Year 1914 FRANKLIN H MARTIN M D Chicago Director General American College of Surgeons

Analysis of the Hospital Standardization Movement During the Last Seven Years MALCOLM T MACEACHERN M D Chicago Associate Director American College of Surgeons Director of Hospital Activities

The University Hospital of Dunedin PROF SIR H LINDO FERGUSON C M G M D Dunedin New Zealand Dean of the Faculty of Medicine University of Otago New Zealand

What the New Zealand Division of the British Medical Association Is Doing toward Improving Hospital Efficiency for the Practitioners of Medicine J S ELLIOTT M D Wellington New Zealand Chairman New Zealand Council British Medical Association

Essentials for the Development and Maintenance of Efficient Hospital Service in Internal Medicine HARLOW BROOKS M D New York Professor of Medicine University and Bellevue Hospital Medical College President American College of Physicians

A Case Record System as a Basis for Appraising Surgical Work (illustrated) C B KEENAN M D Montreal Quebec Lecturer on Surgery McGill University Faculty of Medicine Assistant Surgeon Royal Victoria Hospital

The Hospital and the Doctor as Co-operating Factors in Diagnosis ALLAN CRAIG M D Chicago *Associate Director American College of Surgeons Director of State and Provincial Activities*

Guiding Fundamental Principles of Hospital Standardization. REV C B MOULINIER S J Milwaukee President Catholic Hospital Association

General Discussion

Afternoon Session 2 00 to 5 00

Errors in Surgical Diagnosis Avoidable and Unavoidable—as Seen by the Laboratory Man (illustrated) ARTHUR A EISENBERG M D Cleveland Ohio Director of Laboratories St John's Hospital

The History of the Staff Conference CHARLES A GORDON M D Brooklyn Clinical Professor of Obstetrics and Gynecology Long Island College Hospital

Staff Conference Demonstration Staffs of St Catherine's and Greenpoint Hospitals Brooklyn

Standardizing Staff Conference Procedure ROBERT L. DICKINSON M D New York Clinical Professor of Gynecology Long Island College Hospital

General Discussion

Morning Session October 1 9 30 to 1 30

CHARLES MAYO M D Rochester Minnesota President Presiding

The Relation of the Hospital to the *Departments of Radiology and Pathology* GEORGE S MCREYNOLDS *M D Temple Texas Oculist and Aurist King's Daughters Hospital*

Appraising of Case Record JOHN A WOLFER M D Chicago Assistant Professor of Surgery Northwestern University Medical School Adjunct Surgeon Wesley Memorial Hospital W C DANFORTH M D Evanston Illinois Associate Professor of Gynecology Northwestern University Medical School Attending Gynecologist and Obstetrician Evanston Hospital

Essentials for an Efficient Surgical Service in a *Hospital* CARL A HAMANN M D *Cleveland Professor of* Applied Anatomy and Clinical Surgery Western Reserve University School of Medicine Visiting Surgeon St Vincent's Charity and Cleveland City Hospitals

Essential Features for the Organization and Operation for Special Clinical Departments in a Hospital—

(a) Ophthalmology

(b) Oto Laryngology GEORGE E SHAMBAUGH M D Chicago Professor of Oto Laryngology Rush Medical College Oto Laryngologist Presbyterian Hospital

(c) Obstetrics HERBERT M LITTLE M D Montreal Quebec Assistant Professor of Obstetrics McGill University Faculty of Medicine Obstetrician Montreal Maternity Hospital

(d) Genito Urinary HENRY JOSEPH SCHERCK M D St Louis Missouri Assistant Professor of Genito Urinary Surgery St Louis University School of Medicine Visiting Genito Urinary Surgeon St Louis City Hospital and Genito Urinary Surgeon Missouri Pacific Hospital

Equipment Organization and Management of a Physiotherapy Department in a Hospital ROBERT E PECK M D New Haven Connecticut Director of Physiotherapeutics Grace Hospital

The Clinical Value of Physiotherapy in a Hospital (illustrated) HARRY F MOCK M D Chicago Assistant Professor of Industrial Medicine Rush Medical College Member of Surgical Staff St Luke's Hospital

General Discussion

Afternoon Session 2 00 to 5 00

Fundamental Principles of Hospital Administration from an International Viewpoint E S GILMORE Chicago Superintendent Wesley Memorial Hospital President American Hospital Association

Hospital Administration in New Zealand CHARLES EVANS MAGUIRE M D Auckland New Zealand Superintendent Auckland Hospital

Round Table Conference conducted by CARL E BLACK M D Jacksonville Illinois Surgeon Passavant Memorial and Our Saviour's Hospitals Topics for discussion (1) *Reception and Discharge of* Patients in Hospital (2) Increasing Consultations (3) Essential Operating Room Record (4) Wound Results in Operative Cases (5) Standardizing of Operating Room Technique (6) The Internist and Hospital Standardization (7) *The Autopsy and Hospital Efficiency (8) Selection of* Medical Staff of a Hospital (9) Essentials for Filing Case Records (10) Follow up and Study of End Results

General Discussion

TENTATIVE PROGRAM FOR EVENING MEETINGS

Presidential Meeting Monday October 20—Ballroom Waldorf Astoria 8 P.M.

Address of Welcome EUGENE H POOL M D New York Chairman of New York Committee on Arrangements

Address of Retiring President ALBERT J OCHSNER M D Chicago

Introduction of Foreign Guests

Inaugural Address CHARLES H MAYO M D Rochester Minnesota

The Doctor John B Murphy Oration in Surgery—The Treatment of Spastic Paralysis and Its Experimental Basis N D ROYLE M B Sydney Australia The Significance of the Work JOHN I HUNTER M D Ch M Sydney Australia

Convocation Friday October 3—Ballroom Waldorf Astoria 8 P M

Conferring of Honorary Fellowship

Presentation of Candidates for Fellowship

Presidential Address CHARLES H MAYO M D Rochester Minnesota

Fellowship Address WALTER W CHIPMAN M D F R C S (Edin) Montreal Quebec

NOTE—For the meetings on Tuesday and Thursday evenings in the Ballroom of the Waldorf Astoria and on Wednesday evening in the Academy of Music Brooklyn the Executive Committee is preparing a program of interesting papers to be presented by distinguished surgeons from Europe Australia New Zealand United States and Canada These papers will be discussed by New York and Brooklyn surgeons The complete program will be published in the October issue of this journal Among the speakers will be the following

ALBERT JAMES WALTON M S F R C S London England

H B DEVINE M D Melbourne Australia

RALPH WORRALL M D Sydney Australia

BERTRAM M BERNHEIM M D Baltimore Maryland

SECTION ON SURGERY OF THE EYE EAR NOSE AND THROAT

Tuesday October 21—Empire Room Waldorf Astoria 8 P M

GORDON B NEW M D Rochester Minn Malignant Tumors of the Pharynx Including the Nasopharynx

L W DEAN M D Iowa City Iowa The Treatment of Chronic Otitic Brain Abscess

Thursday October 23—Empire Room Waldorf Astoria 8 P M

FREDERICK H VERHOEFF M D Boston The Pathology of Glaucoma

F PHINIZY CALHOUN M D Atlanta Georgia The Operative and Non Operative Treatment of Glaucoma

SIR HY LINDO FERGUSON C M G M D F R C S I Dunedin New Zealand Subject to be announced

GENERAL SURGERY, GYNECOLOGY OBSTETRICS ORTHOPEDICS, UROLOGY

CLINICS IN NEW YORK HOSPITALS

ROOSEVELT HOSPITAL

Tuesday

CHARLES H. PECK and staff—9 Surgical clinic
HOWARD C. TAYLOR and staff—9 Gynecological clinic
C. P. PETERSON and C. W. LESTER—1 Surgical laboratory demonstration
J. M. STEINER—2 Neurological demonstration

Wednesday

J. M. T. RUSSELL and staff—9 Surgical clinic
WM. CRAIG and W. E. B.—1 Surgical laboratory demonstration
J. M. STEINER—2 Neurological demonstration

Thursday

CHARLES H. PECK and staff—9 Surgical clinic
HOWARD C. TAYLOR and staff—9 Gynecological clinic
I. I. FILBERT—2 Demonstration of surgical technic

Friday

JAMES T. T. and staff—9 Surgical clinic
I. I. KILBORNE—2 Demonstration of surgical technic

ST. VINCENT'S HOSPITAL

Tuesday

STUART J. WALSH, WILLIAM T. JOSEPH BRADY, GEORGE F. R. STEWART and C. J. MCCARTHY, JR.—9 General surgical clinic
GEORGE D. DAVID STEWART, ARTHUR M. WRIGHT, ERNEST FAIRCHILD, RAYMOND I. SCHLEY and EDWARD A. —2 Surgery of the chest

Wednesday

RAYMOND P. SCHLEY—9 Management of cases of hyperthyroidism
JOHN J. WALSH, KRUEGER, JOHN MCCRATH, JAMES I. HENNESSEY, ST. JAMES RAGGIO—2 Lectures and demonstrations

Thursday

GEORGE D. DAVID STEWART, ARTHUR M. WRIGHT, ERNEST FAIRCHILD, RAYMOND P. SCHLEY and EDWARD A. KELLY—9 Abdominal surgery. Clinical cases
EDWARD L. KEYES—10 Urological surgery
REGINALD H. SAYRE and WILLIAM DORAN—2 Orthopedic clinic

SLOANE HOSPITAL

Gynecological and obstetrical clinic. Demonstration. Obstetrical and gynecological pathological findings and results. Pathological findings with stillbirth and neonatal death. Medical complications during pregnancy. Obstetrical hospitals. Pediatric and problems in obstetrical hospital practice. Treatment and end results of the toxemias of pregnancy. Fibroids. Complications of fibroids. End results of pelvic operations for fibroids. Some technical errors in gynecological operations. Hospital rounds and making demonstrations of obstetrical peritonitis.

NEW YORK POST GRADUATE HOSPITAL

Tuesday

JOHN T. LORDMAN—8.30 General surgical clinic
EDWARD W. PETERSON—2 General surgical clinic
W. D. N. KEITH—[illegible] Gynecological clinic
CHARLES OGILVY—4.30 Orthopedic clinic
F. CARTER—4.30 Demonstration of local anesthesia

Wednesday

H. D. FERNALD—9 Gynecological clinic
L. J. UNGER—9 *Demonstration of blood transfusion*
CHARLES GORDON HEYD—[illegible] General surgical clinic
JAMES N. WEST—[illegible] Gynecological clinic
CHARLES A. LLOYD—2.30 Neurological clinic
B. W. MOFFETT—4.30 Orthopedic clinic

Thursday

FRED H. ALLEN—9 Orthopedic clinic
J. BENTLEY SQUIER—9 [illegible] clinic
J. J. MOORHEAD—2 Traumatic surgery
L. J. WEIGEL—4.30 Orthopedic clinic

Friday

EDWARD W. PETERSON—9 General surgical clinic
S. W. BANDLER—9 Gynecological clinic
JOHN F. FROM—[illegible] General surgical clinic
CHARLES OGILVY—4.30 Orthopedic clinic
F. CARTER—4.30 Demonstration of local anesthesia

GENERAL MEMORIAL HOSPITAL

Tuesday

W. S. STONE and FLOYD CRAIGER—9 Cases of lymphosarcoma Hodgkin's disease leukemia
W. B. COLEY—9 Cases of bone sarcoma

Wednesday

B. J. LEE and FRANK F. NADAIR—9 Cases of carcinoma type of mammary carcinoma
WILLIAM P. HEALY and DR. PULLEN—9 Case of carcinoma of uterus and ovary

Thursday

JAMES EWING—Pathological interpretation of tissues specimens from bone tumors
W. S. STONE and LLOYD CRAIGER—1 Discussion of treatment of cancer

Friday

DOUGLAS QUICK and T. JOHNSON—9 Case of cancer of [illegible] and tongue
WILLIAM H. HEALY and D. PULLEN—9 Cases of carcinoma of uterus and ovary

BROAD STREET HOSPITAL

WALTER M. BRICKNER, WALTER G. CRUMP, J. PIERREPONT KENNEDY, ROBERT T. MORRIS, WILLIAM SHEPHERD, JR. and RALPH STEWART—Operative demonstrations and bedside clinic in medical and general surgery
MAXIMILIAN STERN—Urological and cystoscopic demonstrations

PRESBYTERIAN HOSPITAL

Symposium—Surgery of the Gastro-Intestinal Tract

F B Starr Judd and John Van Glahn—Hemorrhage from duodenal ulcer; postmortem studies and a discussion of indications for resection of the pylorus

A O Whipple and Louis Colden—Intestinal obstruction; the location of the lesion; the value of roentgen-ray studies and a discussion of indications for radical removal by gastric resection—Bilharziasis and the Mount Sinai operations

I B Starr John and A O Whipple—Results in radical surgery of the stomach illustrated by follow-up cases

Ross Golden—Diagnostic points in roentgenology of the stomach and duodenum

George Draper—Studies on the constitutional make-up of patients with ulcer of the stomach and duodenum

A O Whipple and I B Starr John—Operative clinic case; surgery

H Gillespie Kingsbury and A O Whipple—Follow-up cases illustrating abdomino-perineal resection for carcinoma of the rectum

Symposium—Biliary Tract Diseases

Ross Golden—X-ray studies in diseases of the biliary tract

Louis Casper Gulden, Louis Bauman and A O Whipple—Results with the Lane method in chronic obstructive jaundice; preliminary report

A O Whipple—Indications for common duct drainage; preliminary report

Louis Burton Newman and D C Bull—Intestinal autointoxication

A O Whipple—Intestinal lowering of virulence by bile

Cecil Drinker—Contributions to the diseases of the bile passages

A O Whipple—Illustrative cases illustrating pancreatic lesions

Demonstrations

Hugh Auchincloss and Ross Golden—Surgery of the bronchi and chest; follow-up results and discussion of X-ray features

Hugh Auchincloss—Closure of pleural sinuses; surgery and indications; follow-up results

Louis Burton Newman—Intestinal therapy; application to surgical cases; Dumas' case of resection with complete hemiplegia and thalamic syndrome; functional tests

J Bentley Squier—Urological surgery; follow-up demonstration

W Bierhaus—Diseases of the thymus

J M Hill—Tuberculous cervical lymphoglandular disease; Caesar's illustrating the pre-operative results

F T Van Beuren Jr—Acute intestinal obstruction; Duncan's case of atresia together with discussion of surgery in relation to it

William Darrach—Fracture clinic

C A Elsberg and Dr Lenfield—Discussion of psychological aspects of the topographical gnosis experimental work and treatment

LINCOLN HOSPITAL

Tuesday

Willis C White—3 Surgical clinic

Wednesday

Seth M Milliken—3 Surgical clinic

Thursday

Percy H Williams—3 Gynecological clinic.

ST LUKE'S HOSPITAL

Tuesday

Walton Martin, William A Downes, W S Schley, N W Green, R W Bolling, H H M Lyle, F S Mathews, John Douglas, M K Smith and E D Truesdell—8.30 General surgical clinic

F Mathews and C M Goodwin—10 Goiter cases

John Douglas—1 Lantern slides demonstrating the diagnosis of subphrenic abscess and collections of fluid below the diaphragm

Wednesday

Walton Martin, William A Downes, W S Schley, N W Green, R W Bolling, H H M Lyle, J S Mathews, John Douglas, M K Smith and E D Truesdell—8.30 General surgical clinic

M K Smith—10 Fracture clinic

H H M Lyle—10.30 Disabilities of the hand

H G Bugbee, F J DuBois and J C Hoch—1.15 Exhibition of portable operating room surgical cases. Lantern slide talk on urological subjects

Thursday

Walton Martin, William A Downes, W S Schley, N W Green, R W Bolling, H H M Lyle, F S Mathews, John Douglas, M K Smith and E D Truesdell—8.30 General surgical clinic

F C Wood—10.30 Clinic on results of radiotherapy

F C Wood—3.30 Lecture and demonstration on the X-ray plant and methods of measurement of X-rays in the radiotherapeutic department

Friday

Walton Martin, William A Downes, W S Schley, N W Green, R W Bolling, H H M Lyle, F S Mathews, John Douglas, M K Smith and E D Truesdell—8.30 General surgical clinic

T H Myers and Associates—Orthopedic clinic

Daily

F C Wood, Demonstration at the Clinic Laboratory. Artificial production of cancer and other phases of research

Dr Brown Radiological demonstration

CITY HOSPITAL

Tuesday

Charles G Child Jr—1 Gynecological clinic

Howard D Collins—3.30 Abdominal operations

James Pederson—3.30 Genito-urinary clinic

Wednesday

Edward Pinkham—11 Gynecological clinic

Parker Syms—2.30 General surgical clinic sacral anesthesia

Thursday

Lyman W Crossman and John C Vaughan—11 General surgical clinic

Nathan W Green—2.30 General surgical clinic local and general anesthesia

J Bayard Clark—2.30 Genito-urinary clinic

Friday

Donald Gordon and Ernest A Campbell—11 Fracture clinic

Albert S Morrow—2.30 General surgical clinic

NEW YORK HOSPITAL

Tuesday

CHARLES L. CRISO—9 Operative Technic of Duodenal Perforation and Its Immediate and Remote Results in Chronic Appendicitis

SPENCER BROWN—2 Operative Clinic of the Month

D. S. WILLY and Staff—2:30 Kidney Operations Demonstrating Differential Diagnosis, Operative Technic and Results, Including Preliminary Preparation and Sacral and Spinal Anesthesia

Wednesday

I. H. DYER—9 Thyroid Operations. Cases Illustrating Surgery of Thyroid Gland and Its Operative Therapy

JAMES M. HITZROT and CLARENCE MARY—2 Fracture Reduction and Demonstration of Cases

W. M. WEST—Empyema

O. S. LOWENSTEIN Staff—2:3 Cystoscopy, Pyelography. Demonstration of Cases Illustrating Operative Results and Regional Anesthesia

Thursday

CHARLES L. CRISO—9 Operative Clinic. Hartmann Operation for Suppurative Appendicitis

EBERHARD WILKE—2 Osteomyelitis, Operative Treatment, Primary Closure, Skin Grafting

JOHN A. WYETH—Hernia

O. S. LOWENSTEIN Staff—Nephrectomy under Paravertebral Anesthesia. Demonstration of Cystoscopy, Pyelography and Ureteral Catheterization under Paravertebral Anesthesia

Friday

I. H. LOEB—9 Gastric Resection, Operative

LEO L. DOYLE—9 Discussion of Follow-up

B. J. LEE—2 Breast Operation. Cases Illustrating Surgical Principles. Follow-up Cases. Cancer Clinic. Follow-up

O. S. LOWENSTEIN Staff—2:3 Clinic of the Cystoscopically Operative Urinary Tract, Medically, Pyelography and X-ray

FLOWER HOSPITAL

Tuesday

H. B. SPENCER—9 Obstetrical Clinic

G. W. LOTT—2 General Surgery

Wednesday

A. I. SCHWARZ—9 Demonstration in Laboratory of Surgical Research

W. F. HAVENS—General Surgery

DR. VALENTINE—Demonstration. Tumors from the Department of Surgical Pathology

Thursday

F. M. SMITH—9 General Surgery

A. I. SCHWARZ—2 General Surgery

Friday

J. H. FORBES—9 Gynecological Clinic

SPENCER CARLETON—Genito-urinary Clinic

O. R. VON BOKAY—Rectal Surgery

I. M. TOWNSEND—2 Demonstration in Clinical Hematology

Daily

Demonstration in Anesthesia for the Laboratory of Surgical Research, the Department of Pathology, Hematology and Bacteriology, Roentgenology

POLYCLINIC HOSPITAL

Tuesday

A. J. OCHSNER—Demonstration of gastro-intestinal fluoroscopy and treatment

J. R. LOVE—Demonstration of Technological Specimens. Special Surgical Conditions. Discussion of Chemical Therapy and Results. Interpretation of Leaves in relation to Operative Hazard

Wednesday

WILLIAM S. RAY—Discussion of Injuries and Demonstration of Operative Procedures

J. B. NEY—Ventricular Extirpation for Advanced Intracranial Pressure. X-ray Demonstration and Operative Clinic

A. S. MAYO—Operative Clinic with Local Anesthesia

J. P. CRAWFORD—General Surgical Operations

C. A. McWILLIAMS—Discussion of the principles of plastic surgery. Demonstration with patients and lantern slides

L. D. CRAVER—Complications of the diabetic state and risk

Thursday

I. J. LANZ—Discussion for Tuberculosis (by appointment)

C. C. CLIFFORD—Gynecologic Clinic

W. WARD—Obstetric Clinic

J. L. KELLY, F. C. KELLER, H. R. KELLY and S. C. SMITH—Gastro-intestinal Surgery. Operative and Discussion of Duodenal Problems. Intra-tracheal Anesthesia. Lantern-slide Demonstration

Friday

D. A. STRICKLER, A. R. STRICKLER and DR. KERSLEY—Urological Clinic. Topography of the Urethra, Illustrated by Cystoscopic Roentgenograms and Pyelograms. Lantern-slide Demonstration of Operations.

METROPOLITAN HOSPITAL

Tuesday

J. H. HUNT and Staff—9 Management of Pelvic Infections in the Female. Discussion of the Results of Current Literature in Septic Abortion

C. B. REED, III, J. F. [illegible]—2:3 Pneumoperitoneum Cholecystography in Chronic Surgical Abdominal Conditions

C. I. BLAND and KENT WARD—[illegible] Surgical Clinic of Tuberculosis Complicating Pregnancy

Wednesday

H. [illegible] SNYDER—9 Demonstration of Fractures of the Pelvis [illegible] Surgical Pregnancy

I. S. ISRAEL—The Modern Cause and Operation

Thursday

J. R. LISA—9 Duodenal Ulcer. Complications of Pulmonary Tuberculosis, Topography

G. S. HYATT GRUBB and Staff—Compound Fractures

Friday

WILLIAM F. HONAN and Staff—Demonstrations and Operations in the Various Forms of Local Paravertebral Spinal and Splanchnic Anesthesia. Peripheral Sympathectomy

S. CARLETON—Urological Clinic

W. E. B. HAMILTON and A. H. BLAIR—Traumatic Clinic. Orthopedic Clinic

C. J. KAY, R. C. CORNELL and M. M. STEINBACH—Surgical Intervention in Pulmonary Tuberculosis.

BELLEVUE HOSPITAL

Tuesday

R S Hooker A V S Lambert J A McCreery and C J McGuire Jr—9 Operations and exhibition of cases of fractures shoulder joint and adjacent parts

Frederick W Rice and Harold Bailey—9 Demonstration of obstetrical cases

Frederick C Holden Onslow Cordon Jr and Edwin Holladay—9 Illustrating gynecological operations with demonstrations of methods for prevention and postoperative care of the patient Methods of undergraduate and postgraduate teaching

Douglas Symmers—2 Aspects of arthritis

J Breckinridge—2 Study of duodenal morphology

W J Redditch—2 Study of gastric mucosa

Seth Hirsch— Cases microscopic sphincter tract

Wednesday

John V Hartwell—9 Operation upper abdominal with demonstration of technic and method of dressing

Frederick W Rice and Harold Bailey—9 Demonstration of obstetrical cases

Harold Santee— Demonstration of suspension treatment for tumors

Joseph E King—2 Exhibition of cases of bladder neurosurgical cases

Thursday

T V Smith Edwin Beer and staff—9 Late results of fracture of neck of femur Late results of perforated gastric and duodenal ulcers

Frederick C Holden Onslow A Cordon Jr and Edwin Holladay—9 Illustrating gynecological operations with demonstrations of methods for prevention and postgraduate teaching

Carl G Burdick and staff— Demonstrations in children's throat poor nutrition mucous retention Empyema methods for treatment and end results Plastic surgery method and end result Primary hæmorrhagic thrombocytopenic type Results of splenectomy

Friday

George D Stewart John Douglas A M Wright R P Wadhams W H Barber and George A Koenig—9 Surgical teaching clinic

Edward Keyes—9 Demonstrations in urological cases

Frederick C Holden Onslow A Cordon Jr and Edwin Holladay—9 Illustrations gynecological operations with demonstrations of methods for prevention and postoperative care of the patient Methods of undergraduate and postgraduate teaching

BRONX HOSPITAL

Tuesday

Max Rosenthal and staff— The hopeless stricture operations hysterectomy etc

Martin Rehling and staff—2 3 Operation on the kidneys and pelvic organs under local and sacral anæsthesia

Thursday

V V Beer and staff—2 Gastroenterological clinic

Friday

H Grad and staff—4 Gynecological clinic

WOMAN'S HOSPITAL

Tuesday

Hermann Grad and E A Bullard—9 Gynecological operations

H G Bugbee and staff—9 Urologic clinic

George Gray Ward Jr and L K Farrar—2 Gynecologic operations

Dr Plaut—2 Pathological laboratory demonstrations

W H Glafke— 3 Gastro-enterological clinic

Wednesday

H E B Pardee—9 Cases of pregnancy complicated with heart disease

T A Dorman and L V Lyons—10 Demonstration of obstetrical wards and delivery room technique

George Gray Ward Jr and L K Farrar—10 Exhibition of radiumcha

W T Kennedy—10 Radiography of pelvic conditions (Dr Peterson's technique)

B H Goff— History system of the Woman's Hospital

D Aldridge— Insufflation clinic

Dr Plaut— Pathological laboratory demonstrations

T V Dorman and L V Lyons—3 Demonstration of new follow up system in obstetrics

Thursday

R M Rawls and W T Kennedy—9 Gynecological operations

H C Bugbee and staff—9 Urological clinic

D Bissell and B H Goff—2 Gynecological operations

D Plaut— Pathological laboratory demonstrations

R E Herendeen—2 30 X ray diagnosis and therapy

Friday

Hermann Grad and E V Bullard—9 Gynecological operations

George Gray Ward Jr and L K Farrar—2 Gynecologic operations

Dr Plaut— Pathological laboratory demonstrations

W H Glafke—3 3 Gastro-enterological clinic

FIFTH AVENUE HOSPITAL

Tuesday

George W Roberts—9 General surgery

L R Kaufman—9 Urology

William F Honan— General surgery

Vinson H Bingham—2 Orthopedic surgery

Wednesday

Walter Gray Crump—9 General surgery

Lewis Loizeaux—9 Obstetrical clinic

William F Honan—2 General surgery

Thursday

William L Sneed—9 Orthopedic surgery

Sprague Carleton—9 Urology

William H Bishop—9 General surgery

Bissell Palmer—2 Oral surgery

Friday

L R Kaufman—9 Urology

Daily

T Drysdale Buchanan and staff Demonstration in anæsthesia

D S D Jessup and staff Conference in surgical pathology

Lewis Gregory Cole and staff X ray demonstrations

NEW YORK INFIRMARY FOR WOMEN AND CHILDREN

Tuesday

MARIE CHARD—9 Clinical lecture
HELEN B. TAYLOR and CORNELIA GETMAN—9 Medical aspects of surgical case
CAROLINE FINLEY—9 Use of forceps in obstetrics

Wednesday

MARIE CHARD and EMMA STRAUSS ANDERSON—9 General surgery
ELISE L. FRANCE—9 Cross-match of cells with blood serum
NANCY JENSEN—9 Hemoroscopy of chest in after breakfast *mouth meal*
LEE EDWARD—9 Demonstration of bacteriological case

Thursday

ELSE L. PERRANCE—9 Narrative demonstration
MARY PUTNAM—9 Surgery of gynecological
WILHELMINA RAGLAND—9 Treatment of normal pregnancy

Friday

ANNA HUBERT—2 Surgical staff
GEORGIA REID—Use of CO2 with methods in asthma and bronchitis

Daily beginning October

AGNES C. VILTER (Boston) The treatment classification of the study of sclerotic intestinal adhesions and deformities of the normal relationships of the peritoneal viscera with peculiar reference to the treatment of the mechanical obstructions due to adhesions which may be divided into three types of gynecological surgical difficulties classified according to the site and extent of the adhesions, what is location and type most and difficult of complications of colon loops due to displacement usually fixed loop spontaneous peritoneal adhesions, acute kinking, atonic adhesions, spontaneous compensation and atmic post-operative mechanical obstruction and stasis congenital adhesions of types of undescended caecum simple and post-operation of the retrogressive empty stomach for retrogressive dilated stomach chain test with peritoneal posit chain gestation trauma pyloric duodenal first portion of the duodenum

GOUVERNEUR HOSPITAL

Tuesday

A. F. SELLEI—Surgical clinic

Wednesday

W. H. W. KNIPF—Demonstration of formalin bacterial bacteriological
L. J. LADIN—3 Gynecological clinic

Thursday

A. E. SELLEI—Surgical clinic

Friday

E. L. KELLOGG—2 Surgical

MANHATTAN MATERNITY HOSPITAL

J. C. EDGAR, AUSTIN FLINT and WILLIAM M. FOX—9 daily Demonstration of indoor and outdoor service history record and filing system nursing clinical service antenatal method *operating room*

NEW YORK NEUROLOGICAL INSTITUTE

Tuesday

C. A. ELSBERG, A. S. TAYLOR, J. H. KENYON and B. R. STOOKEY—9 Operation on the central nervous system

Wednesday

C. A. ELSBERG, A. S. TAYLOR, J. H. KENYON and B. R. STOOKEY—9 Operation on the central nervous system

Thursday

C. A. ELSBERG, A. S. TAYLOR, J. H. KENYON and B. R. STOOKEY—9 Operations on the central nervous system

BETH ISRAEL HOSPITAL

Daily

ISIDOR STERN—9 Laboratory analysis anesthetic in emphysema
CHARLES GOODMAN and staff—General surgical clinic
F. MOSCHOWITZ—2 Pathology of appendicitis
CHARLES COTTLIEB and DR. TAYLOR—Demonstration first test roentgenogram
DR. SCALL—3 Radium treatment in cancer of tongue, gland and glands of neck

Wednesday

RICHARD LEWISOHN—9 Surgical treatment of gastric duodenal ulcers
HARRY F. ISAACS—2 Wet bandages
HARRY F. ISAACS and staff—General surgical clinic
RICHARD LEWISOHN and staff—2 General surgical clinic
M. KAHN—2 Laboratory surgical demonstration
DR. PREISER—2 Physiology of gastro-intestinal tract

Thursday

L. J. LADIN—9 Demonstration of signs of pregnancy
MEYER ROBINSON—10 Lantern lecture on the pathological surgical aspect of bacteriology
I. C. RUBIN—Demonstration with tubo-ovarian filter
HERMAN LORBER—Presentation of case with radium
J. J. LADIN and staff—General surgical clinic

Friday

ARTHUR I. WOLFSTEIN—9 Ehrlich's method of treatment by pathological examination

MT. SINAI HOSPITAL

A. A. BERG and staff—General surgical clinic
EDWIN BEER and staff—General surgical clinic
C. A. ELSBERG and staff—General surgical clinic
A. V. MOSCOWITZ and staff—General surgical clinic
P. W. NATHAN—Orthopedic clinic
LEOPOLD JACHE—Wounded stomach

ST. MARY'S HOSPITAL

Daily

STAFF—9 Medical treatment and diagnosis of neoplasm children Demonstration of specimens, etc.

Friday

STAFF—9 General surgical clinic

LINCOLN HILL HOSPITAL

I z TOREK and staff Car ma f the n th
HERMANN FLEISCHER and staff Local a tsthe ia in per tions o the pper abd m n Hæm ta is in prosta tectomy Pl stic r rtificial an
D WITT STETTEN and staff Ch lecy tectom without d a g Ingu ll r a tech que
CARL EGGERS and taff Che t uppurat
GUSTAV SEELIGMANN and taff C b n t f urge y and ra l m in the tr atm nt of ca t ma of th ute u
IRA R OUTLER l staff Tle u e f ra lium t the m n pause Tl u of \ r y in th t atr t of fib l tum s of the terus The a l t g lpr g e blood ch mu try i the tre tment f hyper es s gr d um The a l bil ty f extr me d to in th t eatm t of cy tic le l ectoc le
WILLIAM H STEWART and t ff Late t d el pm t i the oe tgen gr phic mon t n of th gall bl Ile a d l d y Some r fin m ts in th r th n graphic d g o ffra t e f the k ll
GEORGE L ROTHEN ER nd t ff D m n trati f th K hn test S lt n t bol m in n of las De lop m t f th m rocy t o ary

FORDHAM HOSPITAL

Tu d y

F TEL N d t ff—9 G e l ger
A H H RIGAN l t ff— G ne l urgery

Wed d y

J H KEAN l taff—9 Cen l rgery
L R CUNNIFF l t ff— G n al ge y
J H TELFER d taff— Ol t tri l cl n c

Thu d y

ALEXANDER NICOLL l taff—2 Ce l g ry

Friday

S W BOR TEIN d t ff—9 O th ped c l n c
R E WALSH and t ff— Gen al g y

MISERICORDIA HOSPITAL

FRANCIS T BUTLER—O thoped c l s E d e lt f pe u tr tm nt n pel my l t
JOSEPH A DE LIN—Ope ti s n l d m trati f j l c tun or a
ANTHONY H HI RI N—G ll bladde nd t ma h
EDWARD T KILBANE—S per m ry ter ith t p ope g Symptomat l y thr l jr n l cal ul
WILLIAM W MAYER D m str t by \ y *film of* atyp c es
ROBERT C SCHLEISSNER C sual fi d ngs n nt red t the r ut ne l bo at ry e ami t n f appendic
ALEXANDER H SCHMITT Compl c tions of p egn n y and l bor m n gement and e d r sults

RECONSTRUCTION HOSPITAL

JOSEPH A BLAKE and associate —9 d ily D m n ta t on of th ope tio f the lin f t du tri l cc de t nd d c se Exhib tio f a s llu tr ting m thod f t t ng f t

NEW YORK ORTHOPEDIC HOSPITAL

O th ped c p ratio by the t ff d ily at 8 O t patie t l cs d ily at 30

HOSPITAL FOR RUPTURED AND CRIPPLED

Tuesday

ROYAL WHITMAN l staff—8 30 H p tal round
W B C LEY C J BURDICK and st ff—8 30 Operati e h rn a ch
ROYAL WHITMAN and taff—1 D monstrat n of the abd t n tr tm nt f r fractur of the ne k f the f m r al the rec tructi operat n f r u unit d f actu e n l for arth itis d f rman at th hip
J J ADAIR—2 D m n tr ti n of types f umb li al f m r l n l a gu nal herni e

Wednesday

J J HOGUET J J F ADAIR—9 Operativ hern cl c D m tr t n of p st perat cas s

Thursday

PERCY R FRYS l taff—8 30 J nt oper ti s
ROYAL WHITMAN a d staff—2 D monstrati n of the perativ tr atment of stru tural l t

SKIN AND CANCER HOSPITAL

Tuesday

C \ McWILLIAMS D m nstrati n f plast c surgery an l ope t n fo c ncer

Wednesday

FRANZ TOREK D mon trat on f pla ti surgery a l operat s f c nce

Thursday

GEORGE SEMKE Dem tratio of plastic urgery a l oper ti s f can r

Friday

H H M LYLE D m trati n f pl tic su gery and pe ti s for c nc r

BLTH DAVID HOSPITAL

Tuesday

L BLEGIER—9 U l g cal cli ic

Wednesday

JULIC JARISCH—9 Ob t tr cal cl i
LEO BLECHER—2 Ur l mc l cli
CHARLES GOTTLIEB— \ r s cl n c

Thursday

I MILLER KAHN—9 C ne al u g ry
MAX ROSENTHAL—2 Gyne ol g al l n

Friday

LOUIS DROSIN—9 Obst trical cl n c
L J LADIN—2 Gynecol gi al clin c

ROCKEFELLER INSTITUTE

ALEXIS CARREL and ALBERT H EBELING—Ci emato graph c demo t ati n of ti u g wth
JAMES B MURPHY—Experim ntal a ly i of the ctio of \ r y n can er
WADE H BROWN LOUISE B PEARCE and C M VAN ALLEN—The elatio f the *thy o d to the* mal gn ncy f a t an pl nted ne pl sm
HIDEYO NOGUCHI—Yell w fe r
PEYTON ROUS—Phys ologic l mpl at ons n cholel thias s

LEBANON HOSPITAL

Tuesday

A J Ro GY—9 Gynecological cl n
G SEEL MA N— 30 Gy c logi l cl c
KALPH WALDO—2 3 Gyne ol gical cl c

Wednesday

HENRY ROTH—9 3 Surgical cl c
L MILLER KAH N—9 3 Su gi al clinic

Thursday

A J RONGY—9 Gynecolog cal clin
G SEFLIGMANN—2 30 Gynecol gical l ic
RALPH WALDO—2 30 Gynecologi al clin

Friday

HENRY ROTH—9 30 S rg c l clin c
L MILLER KAHN—9 30 Su gi al cl ic

ITALIAN HOSPITAL

Tuesday

C SAVINI nd V PANONI—9 G er l urg ry
V SELLARO I A SCATURRO—2 Gyn c l gy

Wednesday

F E PARODI a d G MONNA—9 G ral rgery

Thursday

S SALADI o a d D VIG TA o—9 G n ral urg ry
D PETILLO nd M C so— Gen t u n ry lin

Friday

V COCLZZA a d C TOMASULO—9 Gy c l gy

HARLEM HOSPITAL

Wednesday

THOMAS CH RRY— o Rad um t gy ol y
JOHN F Co R —2 I t t l ob tr t n
HENRY S PASCAL—2 B l y fi tul

Friday

THOMAS CH RRY a d ARTH R STEIN— Gyne loo l
operati n nd demon tr ti n
JOHN I CO N s nd PERRY S BOY TO — Tr tm t
of f a tur

PENITENTIARY AND WORKHOUSE HOSPITALS

Tuesday

EDW RD C B E ER—9 P t tect mi pe l d
uprapub c nd sacr l nd p a J rsthes

Wednesday

EDWARD C BREN ER—9 Gynecol cal lin

Thursday

EDWARD C BREN ER—9 D sea f the b h tra t
demon trati g th *urg cal p th logy s f eq tl*
f d n drug dd ts h thert u me ti ed l t
t e

KNICKERBOCKER HOSPITAL

Wednesday

JOHN D UGLAS C A FRINK C C BURD CK J V
B HRER A S ARMSTR NG nd G A KO NG—9
End r ults of h d i junes

Thursday

JOHN D UGLAS C A FRINK C G BURDIC J V
BO IRER A S ARMSTRONG a d G A K NG—9
Ge er l g cal perat n tr umat c a d em ge
cas

Friday

J HN D UGLAS C A FRINK C C BURDICK J V
BOI RER A S ARMSTRON and G A KOE G—9
F l r lts in c mpl ted leg f actures.

ST BARTHOLOMEW S HOSPITAL

Tuesday

J M LYNCH—8 3 Ge eral s rgic l clini

Wednesday

AUSTIN FLI T—8 3 Gynec logic l linic.
V CRUMP— Med c urgic l c ses

Thursday

J M LYNC —9 G e l rgical l nic
I L KELLOGG—2 G n r l s gic l linic

FRENCH HOSPITAL

J P HOGLET—E d result i gastric rg ry
PERCY K. TURNL E—R ult f op r t e nd X ray
tre tm t in c m of the lo g bo es

LYING-IN HOSPITAL

STAF —Obstet c l ope at s nd dem strati s of i
terest ng s ea h aft r oon
J T GWATHMEY—D mo trat o f b tetn l alg
J R LOSEE—D m *tr ti n* of ter sting pathol gical
p cim in th mu um

HOSPITAL FOR JOINT DISEASES

HE RY W F ACENTHAL a d ssoc tes—Daily clinics
sh i g case f ol l t ti g e dart ritis Cases f
n e it l dislocati n f th h p c r d a d u d r
t tm nt C s of d ta h d mil nar a t l g in
th k j int u d with t pe t on Cl b foot
c ses ured d u de t e tme t C ses f f nt le
paralys treated by m ag el tri ty and m scle
ed at o

ST MARK S HOSPITAL

Tuesday

BENJAM T TILT N—3 S rg cal cl n

Wednesday

VICTOR C PEDERSEN—11 U ol gical h

Thursday

WILLIAM A. WILSON— U logical cl nic

CLINICS IN BROOKLYN HOSPITALS

LONG ISLAND COLLEGE HOSPITAL

Tuesday

JOHN O POLAK ALFRED BECK and staff—9 Gynecological clinic and obstetrical clinic

Wednesday

EMIL GOETSCH—9 Goitre clinic demonstration of cases
S POTTER BARTLEY—9 Fracture clinic
ROBERT F BARBER— Demonstration of interesting cases

Thursday

JOHN O POLAK ALFRED BECK and staff—9 Gynecological clinic and obstetrical clinic
HENRY H MORTON HOMER FRASER and staff—3 Genito-urinary clinic

METHODIST EPISCOPAL HOSPITAL

Tuesday

THOMAS B SPENCE HENRY F GRAHAM CHARLES H GOODRICH and H T LANWORTHY—9 General surgical clinic
O P HUMPSTONE and staff—9 Obstetrical clinic

Wednesday

A H BOGART and ROGER DURHAM—9 General surgical clinic
O P HUMPSTONE and staff—9 Obstetrical clinic
I B SMITH—9 Pathological conference
WESLEY H WALLACE—9 X-ray treatment
J C GRAHAM—9 Radium treatment

Thursday

THOMAS B SPENCE HENRY F GRAHAM CHARLES H GOODRICH and H T LANWORTHY—9 General surgical clinic
O P HUMPSTONE and staff—9 Obstetrical clinic
WESLEY H WALLACE—9 X-ray treatment
J C GRAHAM—9 Radium treatment

Friday

RUSSELL S FOWLER and HAROLD K BELL—9 General surgical clinic
O P HUMPSTONE and staff—9 Obstetrical clinic

WYCKOFF HEIGHTS HOSPITAL

Tuesday

JOHN L BAUER—9 Clinical surgical clinic
RUSSELL S FOWLER— General surgical clinic

Wednesday

JOHN HORNI and ARMIN J SIBBEL—9 General surgical clinic
CHARLES J PFLUG— Clinical surgical clinic

Thursday

JOHN L BAUER—9 Clinical surgical clinic
RUSSELL S FOWLER— Clinical surgical clinic
THURSTON H DEXTER— Pathological conference
RUDOLPH F HERRIMAN—3 Obstetrical clinic

Friday

JOHN HORNI and ARMIN J SIBBEL—9 General surgery

KINGS COUNTY HOSPITAL

Tuesday

I H FISKE—9 General surgical clinic
HENRY M MILLS— Demonstration of obstetrical conditions
HOMER F FRASER and CHARLES S COCHRANE—2 General out-patient clinic demonstration of unusual cases

Wednesday

WILLIAM PFEIFFER—9 Gynecological clinic
FRANKLIN B VAN WART— Demonstration of orthopedic cases and corrective appliances
RALPH C WILLIAMS— Demonstration of orthopedic cases and corrective apparatus

Thursday

JOSEPH TENOPYR—9 Demonstration of the treatment of fractures

Friday

RUSSELL M ROMF—9 General surgical clinic

ST MARYS HOSPITAL

Tuesday

W V PASCUAL and T M BRENNAN—9 General surgical clinic
J C WILLIAMS— X-ray therapy high voltage treatment with demonstration of roentgen quantimeter measurement of dosage

Wednesday

J R KEVIN and J P MURPHY—9 General surgical clinic
J C WILLIAMS— X-ray therapy high voltage treatment with demonstration of roentgen quantimeter measurement of dosage
R B WILDERSON— Urological operations under cardiac and local anæsthesia

Thursday

W V PASCUAL and T M BRENNAN—9 General surgical clinic
J G WILLIAMS— X-ray therapy high voltage treatment with demonstration of roentgen quantimeter measurement of dosage
V L ZIMMERMANN—2 Emergency obstetrical operations
SURGICAL STAFF—2 Dry clinic general surgery

Friday

J R KEVIN and J P MURPHY—9 General surgery
J G WILLIAMS— 2 X-ray therapy high voltage treatment demonstration of roentgen quantimeter measurement of dosage
J C MACEVITT and J P CLYNN—2 Gynecological clinic

BROOKLYN CANCER RESEARCH HOSPITAL

WILLIAM FRANCIS CAMPBELL HOWARD T LANGWORTHY JOHN P WINNE and EMIL F KOCH—Tuesday 2 Conference Cancer of the bladder results of radium treatment roentgen therapy in cancer methods of typing cancer

BROOKLYN HOSPITAL

Tuesday

W. A. Sherwood and J. H. Lo—General surgical operations.
R. W. Wyeth—Gynecological operations.
Mary H. Cummings—Demonstration of specimens for pathological department.
N. J. Ratnoff and staff—Gynecological out-patient department.
C. H. V. Hunter and Dexter Mckenna—Orthopedic operations.
J. W. J. [illegible]—Dry clinic on the [illegible] in relation to the [illegible] of infection.
Sturgis Sutton—Demonstration of the [illegible] of surgical conditions.

Wednesday

J. H. F. Jennings and J. K. Tanner—Gallbladder surgery.
K. H. J. Murray and staff—Gynecological [illegible] material clinic.
N. J. Ratnoff and staff—Demonstration on roentgenography, cystoscopy, pyelography [illegible] demonstration of urethral instruments.
Ruth Isaman—Demonstration of surgical conditions.

Thursday

W. A. Sherwood and J. H. [illegible]—General surgical [illegible]
W. H. Cary—Demonstration of [illegible] tubes.
C. H. V. Hunter and Dexter Mckenna—Orthopedic operations.
H. A. Fuller—Syphilis therapy [illegible] salvarsan [illegible] syphilis [illegible] treatment.
N. J. Ratnoff and staff—Gynecological out-patient department.
Clayton H. Coulter—Demonstration of pathological material.
W. H. Field—Demonstration of gynecological surgery.

Friday

John J. Jessup and J. K. Tanner—Operative [illegible] of the [illegible] fold.
N. J. Ratnoff and W. F. Mckenna—Gynecological operations.
W. A. Sutherland and staff—Surgical staff [illegible] (private [illegible] work [illegible] private [illegible] work).
W. A. Stewart and staff—Demonstration of surgical out-patient department [illegible].

JEWISH HOSPITAL

Tuesday

John Linder—General [illegible]
Leo Schwartz—Gynecological [illegible]
Max Leder—Pathological [illegible] conference.

Wednesday

William Linder—General surgical [illegible] Demonstration of new method of local anesthesia.
Adolph Bauer—Gynecological [illegible]
M. C. Wechsler—Roentgenological demonstration.

Thursday

John Linder—General surgical [illegible]
Leo Schwartz—Gynecological [illegible]
Max Leder—Pathological [illegible]

Friday

William Linder—General surgical clinic.

BUSHWICK HOSPITAL

Tuesday

W. F. Lippincott and M. B. Brennan—Gynecological [illegible] operations.
A. M. Judd and [illegible] Smith—Gynecological operations.
J. [illegible] B. [illegible] Driscoll—Orthopedic clinic.

Wednesday

Grover H. Reichardt and V. V. P. Rofelty—General surgical operations.
Nathan Van Willer and Jane [illegible] Pemberton—Obstetrical clinic.

Thursday

Russell M. [illegible] and Hector W. Bryant—General surgical operations.
Theodore Kaiser and Harry Dietzen—Gynecological operations.

Friday

Richard C. Williams and George H. Palmer—Gynecological [illegible]

ST. CATHERINE'S HOSPITAL

Tuesday

Daniel A. McAuliffe—General surgery.
D. Cleveland Hunt—General surgery.

Wednesday

J. H. J. Griffen—Urological clinic.
J. [illegible] McGuire—General surgery and [illegible] anesthesia. [illegible] demonstration of [illegible] transfusion of blood at [illegible].
M. [illegible] Blackwood—Obstetrical clinic.
M. J. Murphy and J. F. Hewitt—Pathological demonstration.

Thursday

Isaac D. [illegible] and D. J. McMurray—General surgery.
Charles A. Gordon, Edward A. Heaney and Joseph A. Driscoll—Gynecology.

Friday

Daniel A. McAuliffe—General surgery.
J. A. McGuire—General surgery, local anesthesia.
Dexter Bullard—General surgery.

CONEY ISLAND HOSPITAL

Tuesday

Victor A. Ruzicka—General medical diagnosis and treatment of the more common fractures and dislocations, the application of plaster casters, Stimson pin-operation, plaster-of-paris technique.

Wednesday

J. A. Shields—Connective tissue diagnosis and treatment of bone and chronic pelvic [illegible]

TRINITY HOSPITAL

William J. Cotter, Campbell and Horace T. Law—Thursday—General surgical [illegible]

ST. CHRISTOPHER'S HOSPITAL

Herbert C. [illegible]—Tuesday—Orthopedic [illegible]

ST PETER'S HOSPITAL

Tuesday

JOSEPH F TODD—8 30 Diagnostic and operative gynecological clinic
GORDON GIBSON—10 30 Diagnostic and operative clinic in pulmonary tuberculosis
J STURDIVANT READ—3 Diagnostic and operative clinic

Wednesday

HUGH M BRENNAN and WM M FANNIN—8 30 Diagnostic and operative clinic in genito-urinary tract

Thursday

FREDERICK C LAFFARD and JAMES J SHAW—8 30 Diagnostic and operative clinic surgery of the upper alimentary tract
JOHN D LUSHBAUGH and LORNE McD RYAN—10 30 Diagnostic and operative clinic in general surgery

Friday

GORDON GIBSON—10 30 Diagnostic and operative clinic in pulmonary tuberculosis

PECK MEMORIAL HOSPITAL

Tuesday

JOHN F RANKIN—9 Clinic in surgical and gynecologic [illegible]
HERBERT WOOD—9 Obstetric [illegible]

Wednesday

WILLIAM JEFFERIES—9 Obstetric clinic
CHARLES H MILLER—10 General surgical [illegible]

Thursday

[illegible] DE FOREST WILLARD—9 Gynecologic clinic
[illegible] A GORDON JR—9 Obstetric clinic

Friday

CHARLES COCHRANE—9 Clinic in surgical [illegible]

CROTON POINT HOSPITAL

Tuesday

ANGELO J SORRENTINO—9 General surgical [illegible]

Wednesday

CHARLES A CALLAHAN—9 General surgical clinic
JOHN M SCANNELL—9 General surgical [illegible]

Thursday

JOHN M SCANNELL—9 General surgical clinic

Friday

ALBERT A [illegible]—9 Orthopedic clinic

HOLY FAMILY HOSPITAL

Tuesday

JAMES M DOYLE—9 General surgical [illegible]
[illegible] MARTIN—10 Gynecological [illegible]

Wednesday

WILLIAM J [illegible]—9 Genecological [illegible]

Thursday

[illegible] H [illegible]—9 General surgical clinic

CUMBERLAND HOSPITAL

Tuesday

WILLIAM L HEEVE—9 General surgical clinic
WILLIAM C DURRIN—2 Gynecological clinic

Wednesday

JOHN F RANKEN—9 General surgical clinic
FREDERICK J MEEKS— Gynecological clinic

Thursday

HERBERT S DUCRET—9 General surgical clinic
MARCUS J SARLES— Gynecological clinic

Friday

ROBERT L WOOD and GEORGE S OLNEY—9 Obstetrical clinic

UNITY HOSPITAL

Tuesday

A M JUDD Interesting gynecological [illegible]
OSLOW GORDON JR Operations during pregnancy

Wednesday

GEORGE J MILLER Several cases of blood transfusion Demonstration of direct blood transfusion instrument At 1 minal operati

Thursday

RALPH M BEACH Interesting gynecologic operati

Friday

GEORGE J MILLER Operation on the gastrointestinal tract Direct blood transfusion

ST JOHN'S HOSPITAL

Tuesday

H BEECKMAN DELATOUR—9 General surgery
STANLEY B THOMAS—2 General surgery

Wednesday

GEORGE F SAMM—9 General surgery
ALFRED W WHITE— Obstetrics

Thursday

WILLIAM H RANKIN—9 General surgery
HAROLD K BELL— General surgery

Friday

WARREN J DUFFIELD—9 General surgery
JOHN C KNAPP—2 Roentgenological demonstration

NORWEGIAN HOSPITAL

Tuesday

[illegible] H [illegible]—8 30 General surgery

Wednesday

HENRY J CRAIGHAM—8 30 General surgery

Thursday

[illegible] W SKELTON—8 30 General surgery

Friday

LOUIS STARK—8 30 General surgery

MIDWOOD SANITARIUM

Tuesday

BURT D HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

Wednesday

BURT D HARRINGTON and CAMERON DUNCAN—General surgery and gynecology

Thursday

BURT D HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

Friday

BURT D HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

U S NAVAL HOSPITAL

Tuesday

CAPTAIN NORMAN J BLACKWOOD and staff—General hospital

Thursday

CAPTAIN NORMAN J BLACKWOOD and staff—Roentgenological demonstrations

Friday

CAPTAIN NORMAN J BLACKWOOD and staff—Diathermy and electrotherapeutics

HOUSE OF ST GILES THE CRIPPLE

WILLIAM S HUBBARD FRANK T LYNE CHARLES D NAPIER FRANK B RICE JACQUES C RUSHMER—Thursday 3 Demonstration of orthopedic cases

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SURGERY OF THE EYE EAR NOSE AND THROAT

CLINICS IN NEW YORK HOSPITALS

NEW YORK POST GRADUATE HOSPITAL

Tuesday

T J HARRIS—1 3 Nose and throat clinic
W C MCFARLAND—2 3 Otological operations
MARTIN COHEN—3 30 Eye clinic Tostoperation Hirathkhunt pyrotomy turpentine fluorescein sac bulatral lavacement Illbut trephining peration cataract extraction

Wednesday

DUNCAN MACPHERSON—1 30 Nose and throat clinic
ROBERT L. LOUGHRAN—3 30 Otological operation
A EDWARD DAVIS—3 30 Demonstration of admiration lens and glasses for prescription of tablets operations for quinsy adptos

Thursday

T J HARRIS—1 30 Nose and throat clinic
W C MCFARLAND—2 3 Otological operations.
MARTIN COHEN—3 3 Eye clinic

Friday

DUNCAN MACPHERSON—1 30 Nose and throat clinic
ROBERT L LOUGHRAN—3 30 Otological operation
F M ALGER—3 3 Eye clinic

LENOX HILL HOSPITAL

RUDOLF C DENIG and staff Treatment of fresh eye burns Operation on the eye
ERNEST F KRUG and staff Study of after-cataract cases through Gullstrand slit lamp
FELIX COHN and staff Oto-laryngological clinic
JOHN D KERNAN and staff Bronchoscopic treatment of lung abscesses

FORDHAM HOSPITAL

Tuesday

CHARLES GRAEF and staff—2 Ophthalmology

Thursday

W M DUNNIGAN S H BASSETT and staff—9 Oto-laryngological clinic

POLYCLINIC HOSPITAL

Tuesday

F M STEPHENS J M SMITH F D NEER GEORGE E. DAVIS and F T FAULKNER—Radical mastoid operation Intracranial complications mastoid operation Demonstration of intracranial complications Demonstration of functional tests for hearing and labyrinth diseases Demonstration of sinus operations the cadaver

Wednesday

C J DAVIS—Functional tests for hearing and labyrinth diseases

Thursday

J M STEIN—2 3 Radical mastoid operation for chronic pyogenic mastoiditis

Friday

G H BELL J V KELLY and C F MCDANNALD—Fundamental Demonstrations of selected clinical cases and operations
E. D WILLIAMS—3 Demonstrations of special operations on the cadaver

CORNELL UNIVERSITY MEDICAL COLLEGE

Tuesday

RICHARD SIEBEL CARL DREYER and M L BERLINER—2 Ophthalmological laboratory Demonstration of Gullstrand slit lamp

Friday

ROBERT G REESE and GEORGE W VANDER VEER—Ophthalmological laboratory

KNAPP MEMORIAL EYE HOSPITAL

ARNOLD KNAPP and associates—Daily Operations on the eye Demonstrations of cases

GOUVERNEUR HOSPITAL

W W CARTER—Tuesday 2 Plastic operation for arsenical dermatitis Bone transplantation for nasal deformities

BELLEVUE HOSPITAL

Tuesday

WESLEY C BOWERS—1 Radical operation on mastoid with demonstration of improvement of hearing thereby. 1 gross portion of a
J D KERNAN—10 Bacheson's pectoral tumor following abscess extensive surgery with exhibition of technique and dressing of case
STAFF—10 Nose and throat clinic Roux dressings demonstration of treating case
J WOLFF— Eye clinic After treatment and follow up
S A AGATSTON—2 Eye clinic Recession operation
C G COAKLEY and associates—2 Otological operations and demonstrations of cases

Wednesday

J W BOWERS—10 Demonstration of the Bell method of tonsillectomy and ligation of vessels Presentation of cases of year after operation showing results
STAFF—10 Nose and throat clinic Rounds dressings demonstration of tertiary cases
S AGATSTON— Eye clinic After treatment and follow up
C G COAKLEY and associates— Otological operations and demonstrations of cases
C H MAY— Administration operations

Thursday

R T ATKINS—10 Fortal peritoneotomy for paralysis sinus with penetration of case
STAFF—10 Nose and throat clinic Rounds dressings demonstration of interesting cases
C H MAY— Eye clinic After treatment and follow up
C G COAKLEY and associates—2 Otological operations and demonstrations of
J WOLFF— Cataract extraction safety flap

Friday

STAFF—10 Nose and throat clinic Rounds dressing demonstration of interesting cases
W B DOHERTY— Eye clinic After treatment and follow up
W B DOHERTY— Enucleation with implant of cork lodge
C G COAKLEY and associates— Ear nose and throat clinic

NEW YORK EYE AND EAR INFIRMARY

Tuesday

CLYDE E MCDANNALD CLOYCE H BELL CONRAD BERENS W B DOHERTY W R BEDINGFIELD J A RENWICK KELLY COX and B L MILTON— Eye Intramuscular implant
CONRAD BERENS— Late nail demonstration of total-occlusive dressing
STAFF— Otological clinic rounds dressing etc
E D BURCHALL— Late sliding mesh implant of specimen of normal and abnormal temporal bone
CERRO H BELL—2 Operation on eye
CLYDE E MCDONNALD— Reese resection for strabismus Reese ptosis operation Enucleation of chronic sac
CONRAD BERENS— Sterile tarsectomy for trabismus
ROBERT LEWIS T LAURENCE SAUNDERS and assistants— 5 Otological operations and demonstration

Wednesday

ROBERT G REESE BENWITT KEY AQUIN S KELLY C A DRAKE I D KRUSKEL W B ALLEN SHOBER SMITH KELLY COX B L MILTON W B BEDINGFIELD and J A RENWICK— 10 Eye clinic After treatment and follow up
GEORGE S DIXON—10 X ray localization of foreign bodies in the globe Demonstration of X ray plates of mastoiditis and sinuitis
STAFF—1 Otological clinic rounds dressing etc
ROBERT C REESE and AQUIN S KELLY— Cataract extraction in the capsule Reese resection for trabismus Reese ptosis operation Iridectomy and conjunctival flap for glaucoma Modified ucleation with gold ball implant Capsulotomy with Reese knife Extraction of complicated cataract under conjunctival flap
EDWARD B DENCH CHARLES F PERKINS FREDERICK WHITING and assistants—2 5 Otological operations and demonstrations

Thursday

JOHN M WHEELER WEBB W WEEKS J H DUNNINGTON R L DURFEE and A B REESE—10 Eye clinic After treatment and follow up
E D BURCHALL— Lantern slide demonstrations and exhibitions of specimens of normal and abnormal temporal bones
STAFF—10 Otological clinic rounds dressing etc
JOHN M WHEELER— Operations for contracted orbit and electrolysis
WEBB WEEKS—2 Tenophine for chronic glaucoma Resection for trabismus
ROBERT LEWIS T LAURENCE SAUNDERS JOHN MCCOY and assistants—2 15 Otological operation and demonstration

Friday

FRANCIS W SHINE BERNARD SAMUELS R L DURFEE and A B REESE—10 Eye clinic After treatment and follow up
B SAMUELS and M L BERLINER— Demonstration of Gullstrand slit lamp Vannes differential pupilloscope and Koeppe eye microscope
G S DIXON—10 Localization of foreign bodies in the globe Demonstration of X ray plates of mastoiditis and sinuitis
STAFF—10 Otological clinic rounds dressings etc
F W SHINE— Motais operation for ptosis
BERNARD SAMUELS—2 Reese resection for strabismus Reese ptosis operation Enucleation with gold ball implant
EDWARD B DENCH CHARLES F PERKINS FREDERICK WHITING and assistants— 5 Ctological operation and demonstrat

ST VINCENT'S HOSPITAL

Tuesday

FRANCIS J QUINLAN—2 Exhibition of nose and throat cases discussion with electropexia

Wednesday

JOSEPH O CONNELL—2 Operation and lantern demonstration of material cases

ST MARK'S HOSPITAL

Thursday

G J ETTENGER—1 30 Operation for sinal fistulas

MANHATTAN EYE EAR AND THROAT HOSPITAL

T d y

FREDERICK M LAW—10 D gnost c valu of X ray in s s an l mast d t n
STAFF—1 D m nstr t n f ot l gi al ca es
STAFF—10 Dem trat n f nose n l thr at cases
STAFF—1 D m n tr t n f ey a
WE DELL C PHILLIPS F P FITZGERALD a d staff—2 Otologi al perati n and d m n trati f cases

Wed nesday

ANDREW A EGGSTON—10 Blood t n fus on in lateral sin thrombo is
STAFF— D m n trat n f ot logic l ses
STAFF—10 D m nstrat on of n e and thr at cases
STAFF— D m t t n of ey ca
ARTHUR B DUEL, J D KE N a l st ff—10 Otol gical pe to s a d d m tr t n f cases

Th sday

FREDERICK M LAW— D g nostic hu of X ray in us and ma t id c f tio
STAFF—9 D m trat f t l gical ca es
STAFF—9 Dem trat f n d th t cases
STAFF— D m n trat of eye
JOHN R PACE JOHN D RICE s l taff— Otological perat n a d d m n trat n f cases.

F d y

HARRIS A HOUGHTON—9 Ma t d t i d bet es
STAFF—10 D m nstrati n f t l gi l ses
STAFF—10 Dem trat n of n d thro t cases
STAFF— D m trat f ey s
JOHN B RAE W C MCFARLAN a d staff— Otological perati d d m nstrat on f c ses

D y t b l mo ed

HARRI N SMITH SA UEL MCCULLAGH E R SS FULLE E d J HN E MACKENTY—Ph log l d l ryngol gical cl cs
EDGAR THOMSON CHARLE KINNEY J SHE VOOD and HERBERT W TTON—Ophth lm l gic l l
GUILFO D ROBI O —R d m t tme t f d ses f ea n se a d thro t
A A EGGSTON—P th f gical dem trat
C J PERATORI—Th t cl n qu f b h c y
H A HOUGHTON—R l t hip f m t l l m t d seas f the n se thro t d e r

METROPOLITAN HOSPITAL

Wed day

C C BOYLE— T pl tati f be f t lag t l ra k d l m t f l
J E TITLER—3 3 Rh ol t d l ryng l g cal cli c

FIFTH AVENUE HOSPITAL

Wed day

L E HETRICK— Ot l gi l cl n
WE TLEY M HUNT—2 Rh l gi l d l ryngological li c

F day

DEW YNE HALLETT—9 Ophthalm logi f clinic
H RD FOSTER—2 Laryngol gi l lin
JOHN W WHE LER— Ophthalm l gi l clin c.

ST LUKE'S HOSPITAL

T d y

C W CUTLER ALFRED WI FR ISAAC HARTSHORNE and staff—2 Op rati th eye
E B DENCH—2 La l c dem nstrat f cases.

Wed d y

A P VOISLAWSKY W M HU T M H MERRI AN a d L T PERRAULT—2 3 Operati nose and th oat clinic

Th d y

A P VOISLAWS Y W M HUNT M H MER IAM d L T PERR LLT— Pes lt f t n flect my
L B DENCH d staff— 5 Ot l gic l perat

Fr d y

C W CUTLER AL ED W I AAC HARTS OR E and staff—2 Eye Cl

MT SINAI HOSPITAL

T d y

ISADO E F IES ER d taff—9 3 D m trat n f t logic l a d n r l gical c a d perat o
S YA KAUER—2 Ope t e n s and throat cl ni b hosc py

Wed d y

J WOL F—2 Cat ra t t t th j t al saf ty fl p
K SCHLIEFA— Pla t c pe t n f ectrop
C B R FRT— D m trati f block æsthesia f th il ry pl
I GOLDSTEI — I t rp t f l hrym l gi d

Th d y

ISADORE FRIFS R and t ff—9 3 D mo trat f t l g l and neu log l es d pe t n
S Y KAUER d st ff— Bro h sc p es d œsopha g sc p s

Frid

ISADO E F I SNER d taff—9 3 D m t ati of ot l g l d rol gical c ses d perat o
S Y K E d t ff— Nose d throat pe ti

CITY HOSPITAL

Wed d y

D IEL S DO HERTY— 30 Oto-l ryng l gi l l pe ti f ll p

Th d

W W AD CILFILLA — 3 Ophthalm logical l m

F id y

DA IEL H WIES d PERRY BARTLETT H UGH— 3 Ophthalm l n l lini

HARLEM HOSPITAL

L M H BB —Th rad T sill t m Mod ned rad cal mast d perat

LEBANON HO PITAL

M D LED RM a d I M HELLER—Frid y 3 Otol ryng logical l

BETH ISRAEL HOSPITAL

Friday

S. J. KOLETZKY—9 Pathology of mid-ll nf ti
A. A. SCHWARTZ—9 Case of labyrinthi di a
[illegible] ON staff—Oto-laryngological clinic
S. J. KOLETZKY and staff—3 Otological clinic

NEW YORK INFIRMARY FOR WOMEN AND CHILDREN

S. [illegible] BLOCHER—Friday [illegible] Nose and throat cl c

FLOWER HOSPITAL

Thursday

[illegible] HERRICK—9 Otological clinic
[illegible] S. MUR[illegible]—Ophthalmological [illegible]

ITALIAN HOSPITAL

Wednesday

M. LOMBARDO and T. I. PAGANELLI—2 Eye clinic

Friday

S. LEVY and J. LAGANELLI—2 Ear nose and throat clinic

ST. MARY'S HOSPITAL

STAFF—Wednesday 9 Tonsillectomies

BETH DAVID HOSPITAL

S. J. KOPETSKY—Tuesday 3 Otological clinic

KNICKERBOCKER HOSPITAL

J. EDGAR WELCH—Tuesday 3 Tonsillectomies

CLINICS IN BROOKLYN HOSPITALS

BROOKLYN EYE AND EAR HOSPITAL

Thursday

FREDERICK BAILEY and J. J. MADDEN—2 Demonstration in the Gull training camp and corneal microscope

Wednesday

CHARLES DALY—2 Operation for quinsy tonsillectomy

Thursday

W. C. BRAISLIN—Radium [illegible]

Friday

CLARENCE G. CRANE—Demonstration Baranyi amination of the ear the demonstration of cases

ST. CATHERINE'S HOSPITAL

Thursday

C. G. FISHER—Ear nose and throat clinic

Wednesday

S. H. DeCOSTE—Ear nose and throat clinic

Thursday

C. G. FISHER—Ear nose and throat clinic

Friday

C. G. FISHER—Ear nose and throat clinic

PECK MEMORIAL HOSPITAL

Thursday

J. MAXWELL STEWART—Nose and throat clinic

Wednesday

ROYAL A. ABBOTT—9 Nose and throat clinic

ST. PETER'S HOSPITAL

[illegible] RD R. DORSEY—Tuesday 3 Nose and throat clinic

U. S. NAVAL HOSPITAL

CAPTAIN NORMAN J. BLACKWOOD and staff—Wednesday Eye nose and throat diseases

WYCKOFF HEIGHTS HOSPITAL

ROBERT MOORHEAD and HARRY MEYERS [illegible] C.—Friday 2 Nose and throat clinic

LUTHERAN HOSPITAL

Thursday

ALEXANDER GILLIGAN—9 Submucous resection of nasal septum sitting and prone positions local and general anesthesia

Wednesday

ALEXANDER GILLIGAN—9 Tonsillectomy and adenectomy local and general anesthesia Sluder technique

Thursday

ALEXANDER GILLIGAN—9 Correction of nasal deformities the external route

Friday

ALEXANDER GILLIGAN—9 Excision of ethmoid Puncture and irrigation of maxillary antrum

CUMBERLAND HOSPITAL

Thursday

J. A. STEWART—30 Nose and throat clinic

Friday

ROYAL A. ABBOTT—Nose and throat clinic

HOLY FAMILY HOSPITAL

GEORGE E. DEELY—Friday 9 Ear nose and throat clinic

KINGS COUNTY HOSPITAL

JOHN W. DURKEE—Wednesday 1 Otological clinic demonstrations of unusual cases

CONEY ISLAND HOSPITAL

LEFFERTS A. McCLELLAN—Thursday Special surgical clinic demonstrations and operations in minor [illegible] to [illegible] diseases of the ear

BROOKLYN HOSPITAL

C. C. CRANE F. H. LASHER and J. M. TAYLOR—Wednesday 1:30 Operative clinic in oto-laryngology Demonstration of the œsophagoscope and bronchoscope

THE MARITIME PROVINCES SECTIONAL MEETING

THE sectional meeting of the Clinical Congress of American College of Surgeons for the Maritime Provinces of Canada was held in conjunction with the annual meeting of the Prince Edward Island Medical Society in Charlottetown Prince Edward Island on July 9 and 10 1924 with headquarters and registration rooms at the Victoria Hotel All scientific sessions were held in the Strand Theatre and the clinics in the local hospitals The attendance was large and the program interesting and instructive The chairman of the Maritime committee Dr Alexander MacNeil of Summerside presided at all the sessions The meeting was exceedingly well conducted through arrangements made by Dr Jenkins and other members of the profession who are to be congratulated upon their efficient organization and work

At the meeting of the Fellows of the College held in the Strand Theatre at 4 30 p m July 9 the following Maritime Committee was elected for next year

Chairman—George H Murphy Halifax
Secretary—Philip Weatherbe Halifax
Councilors—George A B Addy St John Stephen Rice Jenkins Charlottetown

It was decided to meet next year in Halifax

The following visiting speakers were present Dr Frank Lahey Boston Dr A T Bazin Montreal Dr David W MacKenzie Montreal Dr C B Keenan Montreal Dr M T MacEachern Chicago and Dr Allan Craig Chicago

On July 10 the members of the Prince Edward Island Medical Society entertained the Fellows of the College and their wives at a delightful dinner and dance at the Beach Grove Inn

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SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE PUBLISHED MONTHLY

VOLUME XXXIX OCTOBER 1924 NUMBER 4

TRANSPOSITION OF THE OVARY WITH ITS VASCULAR PEDICLE INTO THE UTERUS AFTER SALPINGECTOMY[1]

TECHNIQUE AND ANATOMICAL RESULTS (TWENTY THREE OPERATIONS)

BY PROFESSOR THEODORE TUFFIER PARIS FRANCE

THIS operation which I have performed twenty three times is intended to preserve menstruation and the possibility of pregnancy in women after double salpingectomy

TECHNIQUE

Preoperative Preliminary dilatation of the uterus is accomplished by two sponge tents of increasing size inserted at twelve hour intervals The uterine cavity from the cervix to the fundus will be the size of the index finger or thumb The second tent is removed at the time of the operation and replaced by packing moistened slightly at its extremity in tincture of iodine Its distal extremity hangs outside the vulva and is removed during the operation

1 Laparotomy is done with the patient in the Trendelenburg position Any adhesions are divided and the uterus is freed The tubes are removed but the ovaries are preserved (usually the ovary can be saved only on one side or the ovary least affected is chosen)

The removal of the tubes leaving the ovary intact must be complete The broad ligament must be divided close to the tube The three arteries are ligated separately (Fig 2) Hamostasis must be perfect (Fig 2) This removal of the tube may even necessitate penetration into the lumen of the uterus with or without resection of the cornu if this area is thickened and indurated Lesions of the intra uterine portion of the tube are often very marked

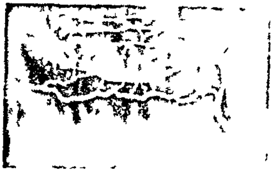
The accompanying drawing (Fig 1) made by my friend Kieffel from a cadaver of a woman of 50 shows the arteries of the tube and the ovary and their relations and their number The exact hemostasis must not involve the tubo ovarian branch for fear of atrophy of the external portion of the ovary The tubal fringe adherent to the ovary is removed thoroughly

The ovary (or even the two ovaries if they are healthy) is left in place It is separated from all surface adhesions and supplied by its vascular pedicle in which the pulsation of the arteries can be felt It is transposed into the uterus

The ovary is prepared (1) by evacuating the largest cyst which it may contain as it is always too big for the capacity of the uterine cavity and (2) by taking three catgut stitches One stitch is pulled through the distal extremity of the ovary so as to make traction and the two others are passed on either side of the junction of the pedicle of the ovary through the peritoneal surface alone (Fig 3)

3 The uterus is elevated by two supporting fingers or by traction on the two stumps of the tubes Incision is made in the posterior lateral corresponding portion of the uterus (Fig 2) This incision is made from the

[1] See Th Tuffier Case of P B II mém Soc d hop d P Oct 5 1920 9 3 Oct obe 3



infer p e n e th u r e e r i t entire tres al v the v xis ac e t the u f the vary. The ovary the uterus r a t i i the mewhat in ward. The uterus cavity is ver l. The taking g rem v l l y t tent m l below the operatus t l led w el g e tel t as if any peri n al t i t t rs. I e as that the ole t r t i exper e c e m ch le freq ent regress that r l l was el If the uterine l stat n in the t rt i may be increased n r t the lar le ar an l r t three l and l at through the uterine w and. If the uterus s l r u and it seems al lately accessary t w or three stamps t l l f r e p may n w be placed on the ut rine mucosa ta an l the a lj inim n l let separat a l evert it. Inci n f the uterus rarely re ulre ap r a ti n f any ligature s any ng wal t p ntaneously r with m mentary application a clamp r king.

a. The intr lu ti n f the ovary Into the uterine cavity is always difficult. First the ovary often n t large may require rese t n in its distal p rti n to allow intr lu tion an l retenti n in the uterine cavity. In ne of my earlier operations I was unable to effect this introduction. Second as a result of chronic periuterine conditions the vascular pedicle of the ovary is often indurated has lost its flexibility is retracted and prevents the introduction of the globular ovary into the uterine cavity. In such a case a section of the broad ligament may be divided to mobilize the pedicle but there must be no lesion of the vessels or nerves.

5. To facilitate the intr l t n of the ovary into the uterine cavity the l of capitat n I have shown ... the ovary ... the uterus ... The tw l ... the upper portion of the ... the ovary ... uterus and the ... in the uterine wall.

6. The ovary having been introduced ... the uterine wall ... are sutured ... The ... The peri ... of the ovarian pedicle which ... the lower pole of the ... the uterine peri n um by a series of peritoneal sutures which however must ... the ovarian pedicle. The ovary is thus ... fixed to the uterus with its pedicle intact. In one case I was able to introduce the two ... one ... the other.

Next we verify the position of the ovary and make sure that it has no lateral tension ... in the position of the suture.

Special points. It is necessary to be sure that where the vascular pedicle of the ovary passes at the inner portion of the wound there is no constriction and that the pedicle lies free in the wound. The lower ... uterine ... should be ... superficial ... the pedicle ... level of the pedicle. At this point the uterine ... should be sutured very securely ... all the peri ... of the ... and vascular pedicle that ... left between the uterine cavity and the external surface. This maneuver is somewhat delicate as there is generally little space and sometimes one has to begin by fixing the pedicle to the uterine muscle and ... closing the rest of the uterine cavity around the ovary.

When the peritoneum of the broad ligament has been divided to facilitate the intr

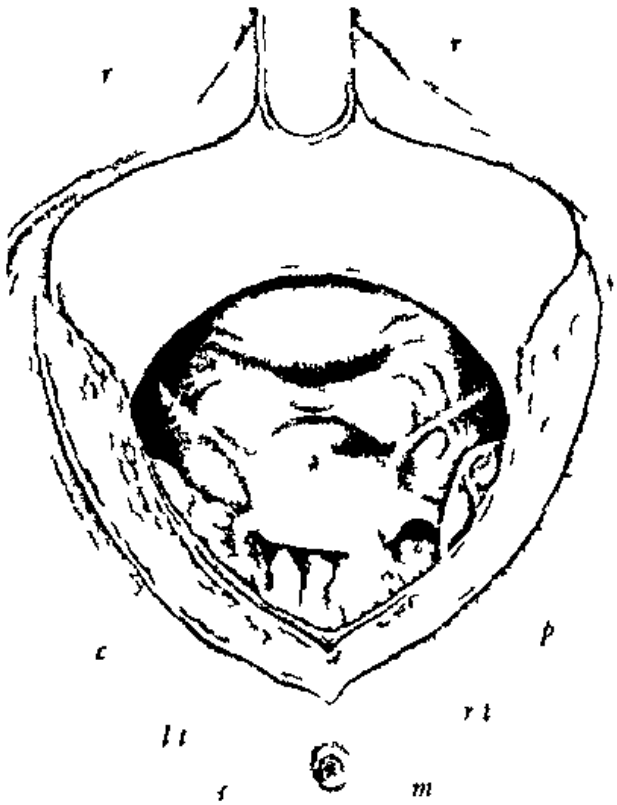


Fig 7 Intestinal obstruction by adhesions and kink of the ureter Ureter and gametic column Surface of left tube blocked by adhesions Fundus Omentum Right tube blocked by the pedicle

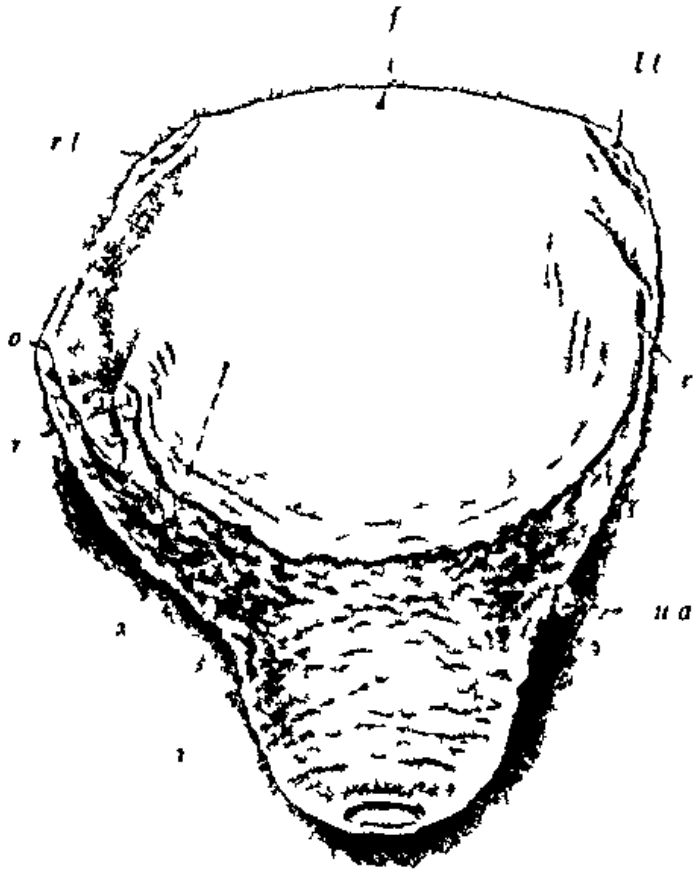


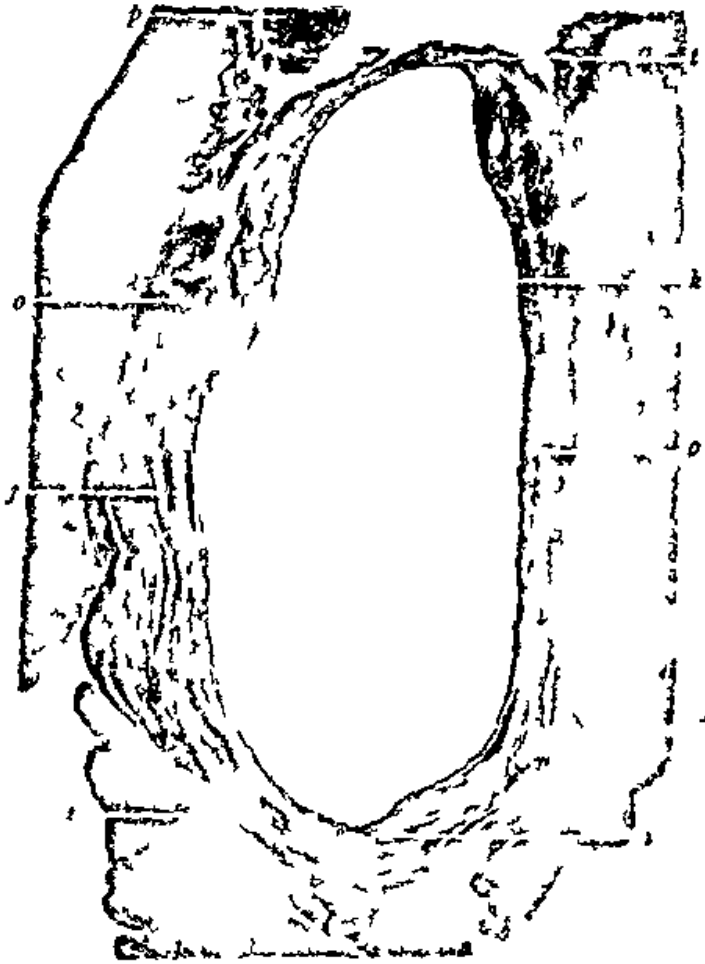
Fig 8 Fundus Surface of right tube Ovarian pedicle of ovary Round ligament Projection made by transposed ovary Surface of uterus Surface of left tube Uterus

the transposition (Fig 7) You can see in Figures 9 and 10 the ovary projecting into the uterine cavity which is perfectly closed A portion of the body of the ovary Figure 10 is in the uterine wall Its structure is normal and a recent corpus luteum (Fig 9) is proof that it functions physiologically The ovarian pedicle is intact (Fig 8)

To obtain a good result the ovary must project slightly into the uterine cavity You note that a portion of the ovary presenting in the uterine cavity (Fig 6) represents only one third of the ovary the other two thirds being buried in the uterine wall This is insufficient because the ovum must fall into the cavity and if too large a portion is contained within the uterine muscle it develops there and its separation cannot be accomplished

On the other hand if the entire ovary hangs within the uterine cavity it acts as a polyp It is all important therefore that it should so to speak adhere by its neck to the uterine muscle and that the whole head should present within the uterine cavity I have reported a case of Petit of a woman who after operation became pregnant with a normal delivery The efficiency of this operation is therefore undoubted although the results are not constant

As regards the duration of function of the transplanted ovary I can say nothing But from my experience with all free grafts in general and with those of the ovary in particular I believe that the vitality of the transplanted ovary may be less than that of the normal ovary Indeed it is known that organs the anatomical situations of which have been shifted become precociously senile perhaps on account of the disturbance of the vascular system or on account of nervous disturbances This fact I have demonstrated in ovaries



I g S ct show n g n ral ew of l on f ry vithin th uterus p Parti laden mat us e lut n of th mucosa o v ı n t s ue ı r g n f th c rp lut um ı ut r mu cl s l wer pole f the ary k y t imp g g n th ru t ss ı upp p l f o ry p oj cting into ut rn cav ty



Fig t O r n tissu reg n f the co p s l t m Ut n t ssue bl od es l ɣ c rp a l t a ar t u h hæm r hagic f cu

grafted without the pedicle and it i the same with other transpositions

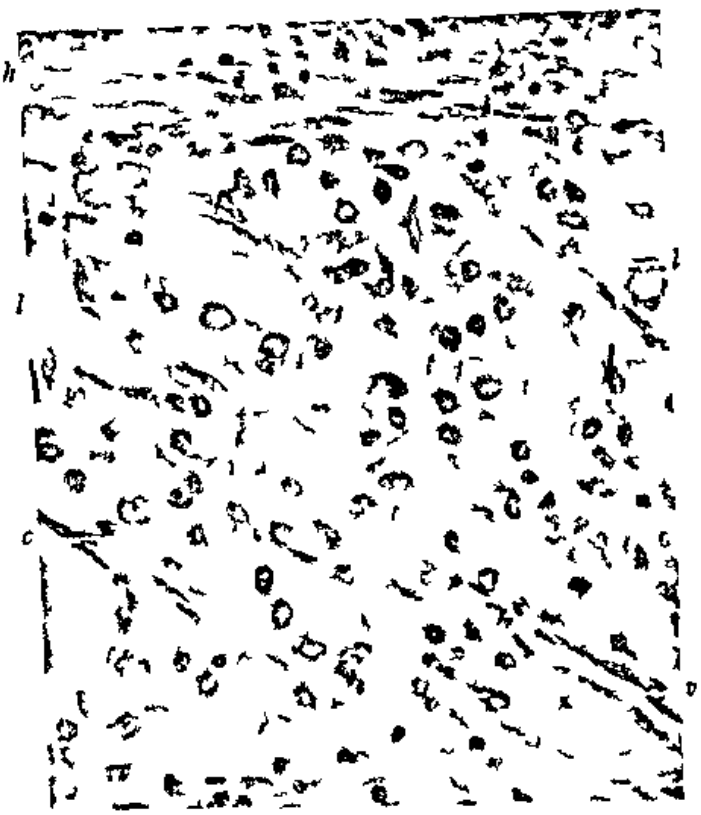
A most convincing histological description made by Professor Le Tulle follows

HISTOLOGICAL EXAMINATION OF AN OVARY ENCLOSED IN THE UTERINE CORNU FOR NINE MONTHS

We have taken for the histological exam ination a fragment of the uterine wall and the entire length of the ovary enclosed there with a corresponding portion of the neurovas cular pedicle of the ovary The incisions are vertical to the axis of the uterus and as nearly parallel as possible to the axis of the enclosed ovary

1 *The ovary* including the gland 1 2 5 cen timeters long and almond shaped It measures *12 millimeters in width on the average* Its center is occupied by a voluminous cystic cavity This cyst al o oval shaped is sur rounded on all sides by ovarian tissue which eems to be embedded The substance of the ovary surrounding the cyst is only 3 milli meters thick with the result that this cystic ovary is reduced to a shell of a fairly regular thickne s although somewhat thinned at its anterior pole The anterior pole presents in the uterine cavity as does also the posterior pole which is obviously in continuity with the neurovascular pedicle (Fig 11)

The ovarian tissue including the section is composed of wave like strands of long con nective tissue cells each with an elongated nucleus and accompanied by a minimum quantity of colloid fibers There are numer ous capillary vessels and prominent arterioles of characteristic aspect running throughout this tissue Here and there are seen little cystic cavities filled by superimposed epith elial cells and graafian follicles One of these contains an ovum The dimensions of these little cysts vary Finally the ovarian tissue



F 13 R g n of the l tem ell h Hæmorrhagic f s ll l te cell c on ect e tu e cells v blood e l



Fig 14 O ule r the cort cal l yer o O le float g in a l ttl l qu d foll cul r epith l um comp essed by the la ge c tr l cy t c fi d cell of the cort cal l ye

is dotted with a rather large number of corpora lutea more or less old (Fig 12) One in particular is more elongated and is situated in the midst of ovarian tissue Its central portion is infiltrated with red cells and is surrounded by a dense layer of lutein cells small sized and clear The greater part of these cells is manifestly compressed by the central ovarian cyst

The central cyst (Fig 11) the clear liquid of which was evacuated at the time of the incision shows the internal wall made up of several layers of little cells with brightly stained clear nuclei with angular protoplasm This layer lies on a very thin strip of elongated connective tissue cells

Immediately below this internal layer there is a second one formed by lutein cells (Fig 13) fairly well stained voluminous with granular protoplasms accumulated in the meshes of the loose connective tissue spread parallel to the surface of the cyst All these characteristics seem to demonstrate that the cyst in question is surely of ovular origin

The anterior pole of the ovary projecting into the uterine cavity forms a sort of wall the deeper portion of which is represented by the apex of the cyst In this region the ovarian tissue underlying the cyst appears much less dense than the lateral portions It creates an extensive wall between the cyst and the uterine cavity In this wall the fixed cells of the fundamental ovarian tissue are rarified and lose their very fine elongated form and at the same time the nucleus is diminished The proportion of colloid fibers is notably increased but they are disposed in thin and loose layers The nutrient blood vessels of the ovarian tissue are diminished in number and even disappear in numerous places One sees true atrophy of the ovarian tissue and this process begins throughout the whole portion of the ovary presenting on the surface of the uterine cavity The epithelial covering of the uterine mucosa and a thin portion of the chorion have developed on the convexity of the included ovary These have continued to cover it with a uniform layer of tall regular cylindrical cells well nourished and resting on the slightly sclerotic chorion

The portion of the ovary included in the thickness of the uterine tissue is recognized first by its great richness of fusiform cells with general rather small dimensions Vascular capillaries run through it A thin band of fibrous tissue is interposed between the tissue of the ovary and an abundance of small muscular fibers of the uterus Very often the transition between the ovarian tissue and the muscular tissue is quite sharp without the appearance of any interposed cicatricial tissue Almost all of the smooth muscular juxta ovarian fibers lie parallel to the ovary *However in approaching the uterine cavity* there are seen some bands of fibrous tissue rather poorly supplied with vessels but pierced by a small number of cavities lined by a single layer of cylindrical epithelium which has begun to atrophy These cavities are mostly a relic of the glandular infoldings of the uterine mucous membrane crowded back by the cystic ovary

2 *The posterior or extra uterine pole of the implanted ovary* (Fig 11) The posterior pole shows a general arrangement similar to that described for the intra uterine portion The cortical substance is thinner and obviously atrophic The fixed cells are very rarified The colloid fibers markedly numerous and fibrillated are often very loose Blood vessels *are scarce This atrophy is sharply defined in* the most convex portion of the ovarian pole On either side of this atrophic zone the cortical surface of the ovary is still very rich in blood vessels and the arteries are normally sinuous It contains some old corpora lutea

The layers surmounting the apex of the ovary *are made up of bundles of cicatricial* tissue occupying the ovarian neurovascular pedicle There are also dense fibroid bundles still rich in blood vessels and containing little bundles of smooth muscular fibers originating in the muscular portion of the uterus

In the middle of the cicatrix there are seen some *follicular islands* and some *masses of* giant cells often grouped around foreign bodies some of which are recognized as debris of catgut The central portion of the cicatricial tissue is occupied by large arterial vessels accompanied with veins and joined to seemingly normal nerve trunks

SUMMARY

The living ovary is included in the thickness of the uterine muscle it projects partly into the uterine cavity and is studded with corpora lutea The ovarian tissue contains a voluminous cyst of ovular origin and a considerable number of microcysts with graafian follicles The uterine mucosa normal throughout makes a little polypoid projection at the level of the ovarian relief On microscopic section the chorion is notably hypertrophic and the glandular convolutions of the mucosa are greatly hypertrophied One is in the presence then of a moderate adenomatous evolution circumscribed and of a still benign appearance

From these facts it is justifiable to transpose an ovary with its pedicle into the uterine cavity in order to preserve menstruation and the possibility of impregnation in women who have undergone double salpingectomy Sterility due to lesions which are seemingly benign or unrecognized is so frequent that it opens up a possibility for the application of this operative measure

In 23 operations from August 7 1922 to January 15 1924 I have had no deaths I have seen two postoperative hæmorrhagic extravasations coming from the section of the broad ligament on the side opposite the transposition I have done one laparotomy and after checking the hæmorrhage I have had *two patients get well*

The after results have been excellent in 21 cases I have reported and shown the specimens of the two late hysterectomies which I have been obliged to perform one for intestinal obstruction not related to the ovarian transposition The two patients are perfectly well *These accidents were* due to imperfections inseparable from the evolution of a new technique

THE SURGERY OF THE KNEE JOINT[1]

By NATHANIEL ALLISON M D F A C S Boston
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THE surgery of the knee joint seems to be influenced by the individual surgeon's liking for either so called radical treatment or his leaning toward so called conservative measures The aim of the surgeon is to conserve the knee joint to an approximation of normal function His attitude is dependent upon his knowledge of the tissues that make up the knee joint and of the behavior of these tissues when they are injured or become diseased His treatment is dependent upon his clinical knowledge and experience He is further influenced by the history of knee joint surgery and by a traditional fear that has been handed down from a past generation This tradition regarding the knee has a well established basis

About one hundred years ago the term white swelling of the knee was used to describe all the disease processes that occur in the knee Wiseman had invented the term tumor albus in the seventeenth century The striking thing about his description of tumor albus is that the knee was white and swollen and that the disease ended usually in loss of limb or loss of life

It is a frequent clinical observation today that the extent of the disease process and the amount of destruction of tissues is far greater than the external appearance of the knee would indicate

Hayward (8) in 1837 tried to discover the different diseases that produced tumor albus of the knee he believed that four different diseases were confused under the term but he recognized in each of these when the limb was amputated to save the patient's life that the synovial membrane was thick the cartilages ulcerated and the bones carious Not infrequently he says there is a collection of pus in the joint cavity

Swain (19) in the sixties of the last century reported a mortality of 116 in 472 cases of knee joint disease in which excision of the knee had been done Of the 356 who survived excision 54 had to be amputated leaving 30 of the original 472 who had useful limbs after excision Hodges at about the same time collected 108 cases of excision of the knee of whom 106 survived the operation and 60 died a mortality of 28 84 per cent In 4 of these cases which had the vigor to survive excision of the joint amputation had to be done and of these 9 died Price (17) also of this period tried to separate the cases that should be primarily amputated from those that promised a favorable result following excision In 238 cases of excision performed in England between 1850 and 1860 there were 55 deaths—one in every 4 3 cases During the same decade amputation showed a mortality of one in every 3 5 cases

As in abdominal surgery so it was with the surgery of the knee joint One can but wonder at and admire the bravery and persistence of a former generation of surgeons

In 1900 Goldthwait (7) reported 38 operations on the knee His purpose was to show by considering *the results obtained* in these 38 operations that operation upon joints need not be feared more than *operations upon* other parts of the body and because of this to urge the importance not only of operating to relieve a *definitely* recognized condition but also to make use of exploratory incisions in the doubtful cases to determine the exact nature of the disease Without this it is impossible in many cases to differentiate in the incipient stage between several different conditions and it is at the very time that the most can be accomplished in the way of treatment if the exact condition is known He had not a single infection in this series His attitude however was sharply criticized at the time as being radical

Flint (6) in about 1900 was concerned with the determination of the dangers of operating on *clean* knees He carefully investigated 237 operations done where the knee joint was not infected Of these 11 became infected and

Read before the Chicago Surgical Society February 9 4

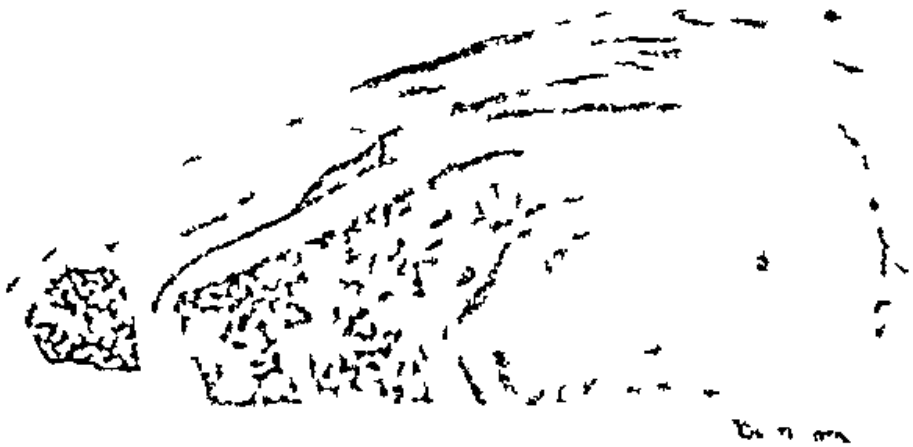


Fig. 1. Horizontal section of knee joint showing the lateral pouch of the joint. The articular surface of the patella and the bearing surface of the femur are covered with hyaline articular cartilage. The lateral surface of the femur is covered with fibrocartilage and synovial membrane. The synovial membrane arises at the edge of the articular cartilage runs backward over the lateral surface of the femur and becomes thickened around the lateral pouch and is reflected around the *popliteal surface to the margin of the articular cartilage* of the patella.

were subsequently reopened meaning that approximately 1 out of every 11 to operations upon clean knees became sufficiently infected to demand incision and draining of the joint, i.e. 4.6 per cent.

In the last quarter of a century the pace of improvement in knee joint surgery has rapidly increased. Several statistical papers well illustrate this fact. D'Arcy Power(16) reported in 1911 complete success in 8 per cent of the operations on clean knees infection being very rare. *Martin (12) in 1912 reported 449 cases* operated upon for semilunar cartilage injuries without a single infection. Mitchiner (13) in 1922 investigating the results of operations for internal knee derangements in Great Britain found that over 85 per cent showed practically *normal return of function*. At the Massachusetts General Hospital in 1930 Goodland Surl (14) in a study of the end results in 181 cases found that 85.7 per cent return to normal function. In the 181 cases there was but one case that might be regarded as an *operative infection of the knee*.

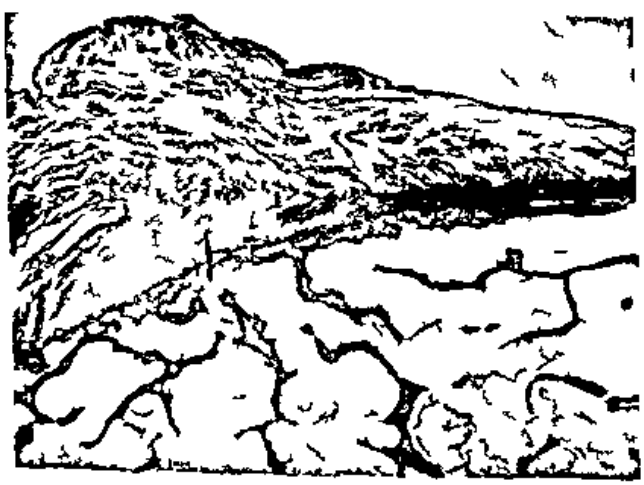
It seems that at the present time knee joint surgery if properly done is not more dangerous to life or limb than is other surgery. The ghost of a dead tradition may still walk however in the minds of surgeons for it is true today *that persons who have disorders in their* knee joints which may be easily corrected by surgical interference are advised to continue the use of conservative measures that offer no hope of relief.

It is the purpose of this paper to endeavor to point out that so-called conservative *measures in knee joint surgery are not as a* rule conservative at all. On the contrary the only possible chance for function in the knee in many of its diseases is recognition and removal of the cause. Also in many knee conditions conservative measure lead later to loss *of limb and even to loss of life*.

Perhaps our attitude toward surgical interference at the knee joint depends upon our knowledge of the structures of the knee joint —their histology, their chemistry, their function in health and disease. The anatomy of the *knee joint is definitely clear to the mind* of most surgeons. The knee joint is our largest synovia lined cavity. The mechanics of the knee joint are not admirably designed for its purpose. It seems that the joint was constructed for the four footed position and not for *one in which the end of the femur* bears directly in vertical manner upon the end of the tibia. This change was brought about by our assuming the upright position. The elephant is the only other animal the hind legs of which are used with the femur vertically opposed to the tibia. Perhaps in consequence of this functional variation from the original architec

tural design we are subject to the various clin ical phenomena which an over strained knee joint produces The articular cartilage of our knee joint presents the largest surface of this kind that we have in our bodies These sur faces in health are smooth and are lubricated by synovial fluid so that the complicated movement of flexion and extension at the knee is accomplished in a smooth gliding manner With the slightest variation of the smoothness of these articular cartilages the knee begins to rub and to grate

H E Trimble Fisher (5) has recently point ed out that the structure of articular cartilage varies with its situation The central portions of the cartilage and the lateral portions of the cartilage show a fundamental difference in structure and nutrition The central portion of the cartilage has a clear matrix on its free surface with a sharp curvilinear margin Be low this surface matrix the cells are flattened so as to conform to the surface No perichon drium is present over the central part of the cartilage but there is little doubt from the de velopment and comparative anatomy of the central part of the cartilage that the cells of the central cartilage are of the same origin as those of the lateral cartilage The lateral carti lage is furnished with perichondrium and is similar in appearance to costal cartilage It is covered with synovia which gives to it a delicate investment of well marked capil laries

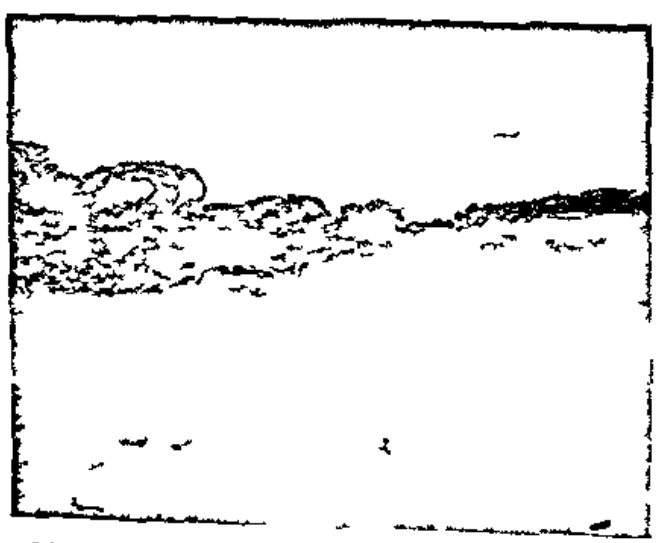


Fg 3 Sect of the lateral co dyl f f m e m ed at t p y h tly fte d ath h ws the fib t l g c en g f th ca cellous bon a d lyi g pon th the th ck p tion f the syno al membr ne



Fg 2 Section of the normal femor l j int surface take at autopsy shortly fter death Cancell s b ne maki g p the end of the femur i here shown with the n rmal a ang ment of the ma ow The cart lage covering the bone nd here presents a normal appeara ce Th cells are ar r ng d vert cally in the deep r laye a d te d to become horiz ntal in th arr gement t the middle of th cartilage nd nearing the joint surf ce they a e a anged par llel to the surface The asc lar carp t of bone upon wh ch the hyal ne cartil g e ts is hown

The articular cartilage being free of blood supply gains its nourishment probably in three different ways Hunter described the circulus articuli vasculosis which lies near the articular edge and gives delicate off shoots to the lateral part of the articular cartilage Toynbee considered the articular cartilage as



Fg 3 *b* Pr lo g t o of syn vial memb a e as it b om thinn d pp h g the a t cula a til ge lo g th late l s f c f th f mor l c ndyl In th s secti n of yno l membr e e en the f lds nd crypt l ke sp ces h d w th d th l um like cells from wh ch th normal syn ial fl d s secreted



Fig. 4.—At the hyaline cartilage which occurs actively in fatty tissue. In this case the cartilage was infected with tubercle bacilli. The cartilage was broken through and the inflammatory edge and granulation tissue are seen projecting through the cartilage into the joint space.

deriving its nutrition from plasma exuded from the capillary loops lying in the cancellous spaces in the subarticular layer of bone resting on a vascular carpet as it were. Strangeways argues that the synovial fluid is the source of nutrition for the articular cartilage. So very little is known of the normal synovial fluid as Fisher points out that no conclusion can be definitely reached concerning it as a source of nutrition. There have been very few analyses recorded of normal synovial fluid. This is the substance of Fisher's study. The cartilage when injured heals by fibrous scar. Chondroblasts have no chondrogenetic power.

The synovial membrane is also a structure about which there is very little known. It differs markedly in its structure in different situations in the same articulation. It consists of a single layer of endothelial like cells beneath which there is a layer of loose con-

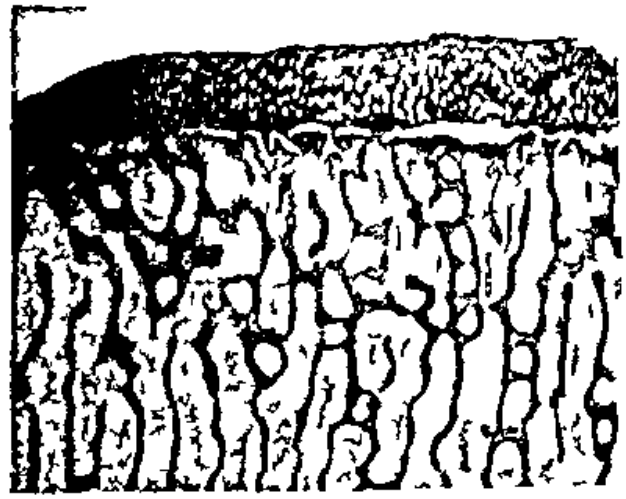


Fig. 5.—The base of the defect. Downward ingrowth of granulation tissue. The surface is being raised from the base of the defect by the granulations.

nective tissue rich in capillaries nerves and lymphatics. In certain pots the loose connective tissue layer abuts practically on the joint cavity without a layer of endothelial cells so that the membrane has great power of absorption. At the articular margins the endothelial layer is very deficient. The synovial secretion comes from the cells on the surface into the joint cavity and from certain deeper cells which discharge their mucin into the loose connective tissue spaces where it is squeezed out by joint movement. About certain fat processes which project into joints such as the infrapatellar pad of fat there is a rich zone of these secretive cells to which the name of synovial glands was given by Clopton Havers. Movement squeezes the secretion out of these glands and the mucin secreted is a pure lubricant. It is not generally believed that the synovial membrane is richly supplied with nerves. Fisher has shown by special staining methods that there are delicate nerve fibrils forming a plexus in the subendothelial layer and also a further plexus immediately beneath the secretory layer of cells. The power of absorption of the synovial membrane is apparently very great and is similar to that carried on by the peritoneum.

Most surgeons will readily recall the significance of this power of absorption. The important fact from the standpoint of surgical pathology to bear in mind concerning articular cartilage is that it supplies a barrier to the



Fig 6 Tuberculosis of the knee The tuberculous process has destroyed the articular cartilage of the condyles of the femur The articular surface is undermined by tuberculous granulations The marrow spaces are filled with granulations A typical picture of tuberculosis a process of destruction



Fig 7 Tuberculosis of the synovial membrane A marked round cell infiltration of the synovial membrane made up from round cells with few epithelioid cells and typical giant cells—the characteristic appearance of tubercles in the synovial membrane

progress of disease from the bones to the joints

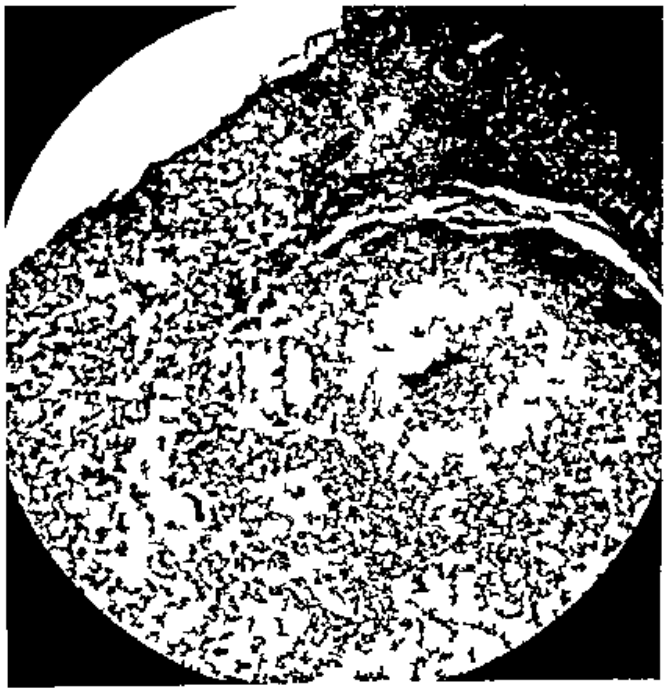
It is well known that in old tuberculous joint disease the cartilage remains intact long after the bone below has been destroyed by the disease This resisting power to local necrosis and absorption on the part of the cartilage is very interesting It is difficult to explain when we consider how poorly nourished the structure of the cartilage is It has been observed by Hemister (15) that in acute infectious involvement of a joint by the ordinary pus producing bacteria the joint cartilages are destroyed at their bearing points and that the remainder of the cartilage is later involved After a rift has taken place however in the cartilage and granulation tissue has entered the joint cavity it is only a question of time until what will remain of the clear cut elastic cartilage will be small islands of degenerated cartilage surrounded by masses of fibrous tissue

From a surgical point of view it must be realized that where the cartilage has become injured or diseased and has been invaded by fibrovascular tissue from the marrow spaces of the cancellous bone nature has started on her plan of joint obliteration with the establishment of ankylosis as a result

Allison and Brooks (1) have studied this process experimentally and summarized it as follows

From the experiments in which the joint cavity was infected with tubercle bacilli or staphylococci or in which a slight injury was done the joint cartilage we are led to believe that any inflammatory process within a joint which is of sufficient severity to result in the formation of granulation tissue will destroy the joint cartilages The cartilage is absorbed at its margin by granulation tissue from the synovial membrane and at its base by granulation tissue from the bone marrow

By the experiments in which the cartilage was removed by operation or the joint partly excised we have shown that ankylosis by bone is a slowly developing process which consists of the following stages first there is union by granulation tissue second there is union by dense fibrous tissue third there is a metaplasia of fibrous tissue into fibrocartilage and a direct transformation of this tissue into bone



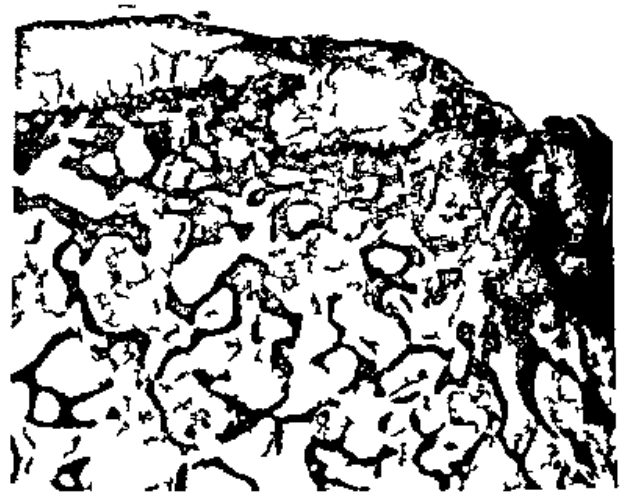
F g 8 Tub cul s f th yno l m mbr Cha act n t c f l a ra g m t f p theho d a d gia t ll w th w den g m le c ll nfiltr t n a d fib bla t

The shortest period of time in which complete bony ankylosis was observed experimentally was 180 days In man the duration of the process i equally prolonged

The long duration of the process of osseous ankylosis we believe explains the following After arthroplasty a joint may allow motion for some weeks and subsequently become stiff Fractures of the epiphysis unite by bone slow ly It also suggests that the conclusion reached by certain investigators that the in terposition of soft parts prevents bony anky losis is misleading in that many of the experi ments were of insufficient duration

The difference which exists between the epiphysis and diaphysis in the capacity for bone regeneration is explained by the fact that there is no periosteum on the epiphysis and as MacEwen (11) has pointed out by the lower ed osteogenetic power of the osteoblasts of the epiphyses It is essential for free gliding com fortable movement of joints that bones be covered at their articular ends by smooth hyaline cartilage

In the various well known clinical condi tions that arise in the knee joint it seems quite evident that the important structure to save



F g 9 Staphylococc s a i fect f kn j t Section of fem al dyle h ing a ea f cartil e d tru t n he e p ess h d occur d (N t s e Phemis- te s ob rv t) The t c la c rtil e is being dis- sol ed in th nfl mmat ry exudate

is the joint cartilage of the knee Having lost its integrity joint function i of neces ity more or less completely destroyed

It is evident from the nature of certain knee joint involvement that true joint func tion by this meaning painless weight bearin stability and a certain degree of free motion is ultimately doomed In this type of lesion it would seem the wi er policy to aid nature in her plan to obliterate the joint Especially is this true when a disease process carries with it an unmistakable menace to the life of the individual as well as the menace of loss of limb

In simple words it seems advisable to dis cover the type of lesion of the knee in which surgery properly done will preserve the joint cartilage intact Also to recognize early the type of lesion in which surgery should remove the barrier to ankylosis i e the joint cartila e assisting in the obliteration of joint function — thi latter method being used in order that the disease process may die out and the life and limb of the individual be truly conserved

From this point of view it would seem much wiser to abandon ultraconservati m of atti tude toward knee joint surgery and assume that in proper surgical measures alone lie the true conservation of knee joint function

At the present time it i well demonstrated that certain knee joint affections may be cured by surgical interference The well



Fig. 10 Infectious arthritis of knee joint synovial membrane showing pathologic emergence of thickened villi with perivascular cellular infiltration of mononuclear cells. The cellular arrangement in places tends to focal segmentation. So-called villi arthritis.



Fig. 11 Chronic villous arthritis. Microscopic section of the synovial membrane removed at synovectomy showing cellular infiltration of mononuclear cells. The synovial membrane here is much thickened and of a dark red color.

established clinical group known as internal derangements of the knee including a variety of lesions of the knee joint structures which may be in a high percentage of instances relieved entirely the knee joints being conserved to normal function. In this group are such conditions as injury or displacement of the semilunar cartilages internal or external loose bodies in the joint as a result of trauma tism or cartilage disease hypertrophic changes in the cartilage or synovial membrane or bone and chronic arthritis.

An ordinary surgical experience is that of the patient who has for years worn plaster of Paris splints brace or knee caps but who has had at no time freedom from pain or disability who has spent much time and money on electricity baking and massage and manipulative treatment both orthodox and unorthodox and who still has a knee unequal to the test of normal function.

A proper diagnosis is what is needed here and after that proper surgical treatment. The treatment has not been conservative for the simple reason that throughout the knee has been deteriorating the joint cartilages have been losing their integrity and loss of knee function has been approaching as a logical result. With proper surgical operative treatment between 80 and 90 per cent of these patients recover the function of their knee joints.

As in times gone by it was observed that the external examination of a knee often gave little indication of the extent of the disease process within the joint so it is today. Diagnosis must of necessity be made upon inspection of the joint surfaces and examination of the tissues of the joint in many of the knee joint lesions which are called internal derangements.

This observation is especially true in the so called chronic arthritis cases—those with thickened synovial membranes constant excess of fluid pain and grating on movement.

Goldthwait (7) in 1900 removed the thickened synovial membrane in several such knees. Since that time so-called synovectomy has developed as an operative procedure. Many chronic boggy knees may be returned to normal function by this operation. Since 1904 the writer has operated upon many knees of this particular variety without infection and with conservation of the normal function of the

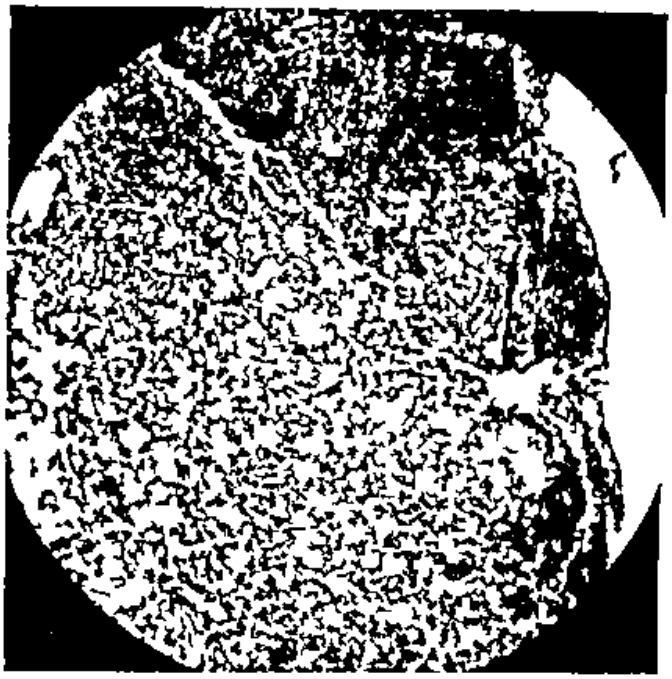


Fig. 12. Acute gonorrhoeal arthritis synovial membrane removed by synovectomy shows an acute inflammatory process with intense vascular dilatation cellular infiltration and hæmorrhagic tendency.



Fig. 13. A photomicrograph of a section showing typical chronic gonorrhoeal arthritis. A thickened fibrous synovial membrane with dense fibrous changes and considerable infiltration.

knee in over 80 per cent. Recently Paul Swett (20) and Ellis Jones (10) have reported series of successful synovectomies for chronic arthritis.

Proper conservatism means conservation of the structures of the knee joint.

It is with the acute infections of the knee joint and the progressive disease processes that we are here chiefly concerned. What constitutes true conservatism when we are dealing with these more menacing and destructive conditions?

Nowhere in surgery is early diagnosis more essential than in knee joint involvement. In tuberculosis in syphilis in gonorrhœal infection and in the various types of pus infection our treatment to be properly conservative rests entirely upon accurate diagnosis. To secure accurate diagnosis inspection of the joint surfaces the removal of tissue for section and guinea pig tests as well as fluid and material for culture are not only advisable but necessary.

In the acute infections such as streptococcus staphylococcus and pneumococcus fluid removed by puncture and examined in smear and culture will determine the nature of the agency at work.

The observation made by Phemister that in this type of joint lesion the cartilage breaks down at bearing point of pressure is a most valuable one. Granulation tissue from the margins of the cartilage invade it and destroy it before the bones beneath have become infected.

No one can disagree with the statement that in these conditions early surgical interference is alone the hope of conservation of the joint. These serious rapid and menacing disease processes may be the result of hæmatogenous infection or infection from injury. During the war knee joint infection as a result of gunshot injury was one of the most direful conditions that surgeons had to face. Gosset who worked at Challon had unusual success in handling these knee joint injuries and infections. His success was largely due to the fact that patients entered his hospital within 6 hours after they had been injured. His procedure with them might have been called radical in the past. As a matter of fact it was highly conservative of both life and limb and knee joint function. He opened such knees thoroughly so that he could observe the entire joint he removed injured tissue he flushed

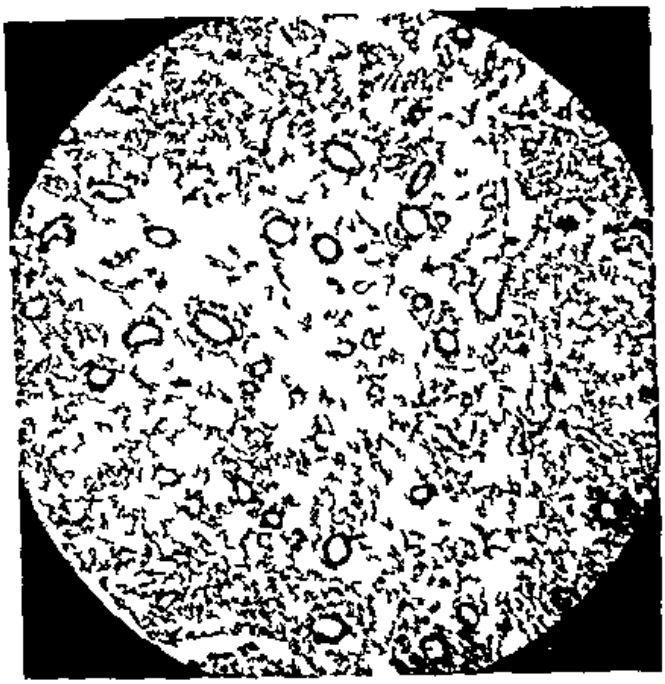


Fig 14 Syphilitic arthritis of knee joint Synovial membrane removed for diagnostic purposes Synovia is œdematous and of a dark red color The disease process is very vascular and there is intense serous and ring cell infiltration with lymphoplasm cells primarily mature There are numerous giant cells but the endothelial cells of the small vessels show proliferation It is difficult to differentiate between the microscopic picture presented by tuberculosis and syphilis of the synovial membrane

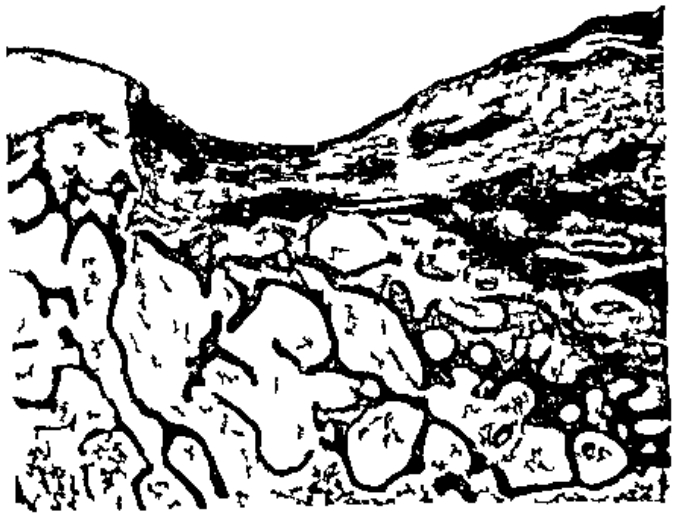


Fig Destruction of the articular cartilage and the underlying cancellous bone at acute purulent infection of the knee joint This section was taken at a point of pressure between the condyles of the femur and the end of the tibia

them out with salt solution in some instances he closed them primarily and got first intention healing and normal function Others he treated with Carrel Dakin solution and did secondary closures after disinfection In others and this is important for our present consideration he expected ankylosis because of the amount of cartilage injury and did all he could to aid its early establishment

It seems that acute infections of the knee if not treated by early surgical measures designed to lessen the pressure on the joint cartilages and to disinfect the joint cavity will go on to a stage that is too far below par for amputation to save the individual The sequence of events suggests that the surgeon is a step behind the disease process similar to the situation that may obtain in the treatment of carcinoma At best the result is complete loss of knee function

Willems (21) in 1918 described a new and practically a revolutionary treatment for acutely infected knee joints As is well known his method of treatment consisted of making drainage opening into the knee joint and then encouraging the patient to use the joint in function The important point insisted upon by him was that the patient should move his joint by voluntary action of his muscles and that passive motion should be absolutely prohibited In case destruction of the intra articular structures does not preclude the possibility of this treatment we may agree with Willems observation that better drainage is established by motion than by rest Certain it is that many knees acutely infected with pus producing organisms have given most surprising results when treated in this manner In one series of 18 cases there were no deaths no amputations or resections and there were only 2 of the 18 who had resultant stiff joints Duval (4) has pointed out that the knee joint wounds in the French army in 1915 showed 7 5 per cent mortality and 30 per cent amputation Due to the early resort to arthrotomy debridement and complete suture up to 36 hours after injury and to immediate mobilization of the knee the death rate in 1918 had fallen to 1 per cent amputation to 2 8 per cent and there were 86 5 per cent of good functional results

The acute fulminating knee joint infections are not common in times of peace but the lesson learned in the war regarding their treatment should not be lost



Fig 6 Showing the fibrous attachment of the joint (dog's knee) in which the articular cartilages of the femur and tibia are destroyed and the bones are united by fibrous tissue The process is a kylosing hemorrhagic arthritis

Tuberculous gonorrhœal and syphilitic knee infections are present in most surgical practice The gonorrhœal knee presents little *difficulty in diagnosis as a rule* The history and clinical picture give reliable data and the gonococcus is found in the fluid taken from the joint

These infected knees fall into two distinct classes In one the process is very active the patient has high temperature the knee joint is swollen and hot and exceedingly painful to movement Here the proper conservation of *the knee joint demands arthrotomy washing* out with salt solution removal of the thickened synovial membrane and primary closure After this is done the patient's temperature will immediately fall the knee joint cease to be painful and the integrity of the joint cartilages will be conserved In the other type of gonorrhœal knee the symptoms are not severe the patient has no elevation of temperature and the knee is full of excess synovial secretion In this type the knee may be tapped as a therapeutic measure the fluid withdrawn and injected into the subcutaneous area of the body The important observation to make in acute or chronic gonorrhœal infection of the knee joint is the extent to which the synovial membrane is thickened and the possible danger to the joint cartilages It would seem a much wiser policy to perform an arthrotomy on the majority of these knee joints as the percentage that get well without active surgical treatment is comparatively small

The diagnosis of syphilis of the knee joint is made by discovering the blood to be positive to the Wassermann test Knees thus infected respond readily to antisyphilitic treatment

Tuberculosis of the knee is seen both in children and in adults It has long been considered proper to regard the occurrence of this disease when in an adult as being somewhat different to that seen in a child In a former time operative interference on tuberculous knees both in adults and children meant a wide excision of the joint Of course in children this was exceedingly disastrous due to its interference with the bony growth of the lower extremity Since the days of the first description of tumor albus by Wiseman it has been good surgical practice in adults either to attempt excision or to amputate the lower extremity for tuberculosis of the knee

Sever and Fisk (18) in 1915 reviewed the results obtained in 638 children treated at the Boston Children's Hospital between the years 1880 and 1910 Considering ankylosis in a good position for function and cure without motion as good results there were 65 per cent only of satisfactory results obtained and 35 per cent unsatisfactory

As above stated the main objection to early operation on tuberculosis of the knee in childhood has been the interference with bone growth Cohn (3) has studied the process of ossification and believes that at 15 years and 4 months on the average there is complete ossification within the epiphyses of the femur and tibia and that union of the respective

epiphyses and diaphyses has taken place In spite of this observation which concurs with our general knowledge as to the growth of the lower extremity operations on the knee for tuberculosis are as a rule delayed until adult life is reached

At present there seems to be a concurrence of opinion that there is no sure cure for tuberculosis of the knee except in the establishment of bony ankylosis at the knee In adults with tuberculosis of the knee there is little hesitancy as to the propriety of excision of the knee In children the opposite opinion is generally held

Tuberculosis of the knee during childhood may become quiescent or may continue active In either event the knee is protected by plaster of Paris or splints Lack of function of the affected lower extremity is secured by the use of crutches for many years Such a patient is carrying a tuberculous knee which may become active in the years of adolescence or in the early adult life The truth of this statement is borne out by the number of adult patients with tuberculous knees whose history of disease dates back to childhood It would seem wise to discover a method by which this long period of the greater or less activity of a menacing disease process may be eliminated The statistics cited above collected by Sever and Fisk show that 35 per cent of knees treated conservatively in childhood are unsuccessful

Tuberculosis in the skeleton is a constant menace to the life of the individual

Ankylosis of the knee is apparently the only cure for tuberculosis of the knee

Without fear of contradiction it may be said that this is generally admitted to be true when tuberculosis affects the knee of an adult individual

The operation that should be done is the removal of the barrier to bony ankylosis namely the articular cartilage of the femur tibia and patella

In individuals who have not gained their bone growth but who have tuberculosis of the knee it would seem wise to make the diagnosis early by exploratory arthrotomy to secure the diagnosis by section of tissue removed and by guinea pig test In case the disease is positive

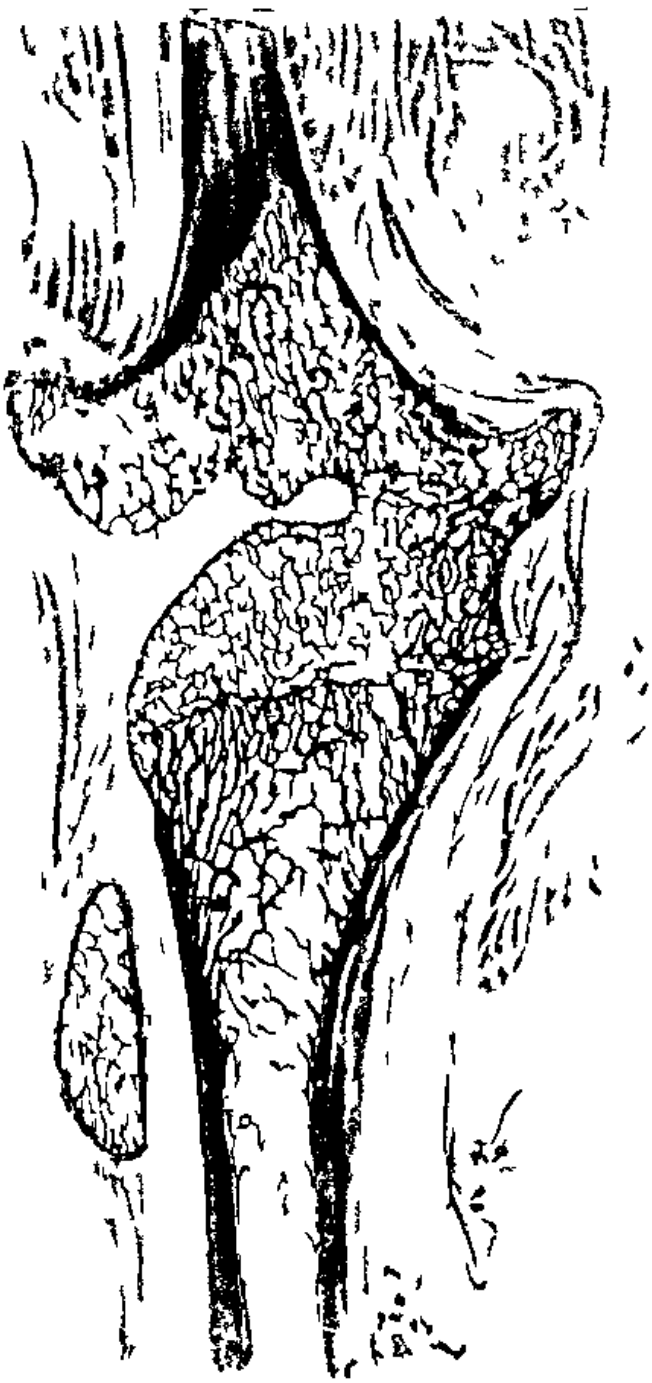


Fig 17 Section taken from permanent joint (dog's knee) 181 days after removal of the articular cartilage showing the process of ankylosis between the bones completed

ly found to be tuberculosis the joint cartilage should be removed from the femur tibia and patella in order to secure at an early date an ankylosis with the leg in straight vertical position with the thigh Hibbs (9) has described an operation for bone fusion which serves as a model of proper technique This operation should not inhibit growth of the

lower extremity as the e l yseal areas are n t interf re l w h It e m that the q es ti n f er with has be n th r a n tum ing block to the p oe tr atm nt of tube c sis of the knee in childh l It l al t tl t re on th other hand that treatm nt by co servative m th s ach a p ster cf lan plint th u e crutch as ll k ff th n el th l w r extrem ty th r sh n t gr wi n pen l will pr b re atm nt th t n terferen e with th gr wth of th t at nuts Il e x r r ati by thate s l s e n use the l ep n s wh h d vel p between th s r l s r m s and th in s l ex tremity e pe ially when the latter has been con l in p a t r cf lan e l m p will sh wn x r s tu ls (1) at s b Al w a and Hr k (2)

The change n l e nt l e e lt from lack of u the gr win pen l are f particular interest be a e tw l r g r re es are operati e t th r and the u n mat r ult a marked change in th arle r ar l th wh l ll e t smaller b th in l ngth and thickness the d crease in th knee a r e n e tam that in l ngth l urth r r e th e nrati n in th ka s s m re mar l in th shaft than in th ep ph e p tal l anal t fs th n e large ment at the ep s l tr e r The thick f th e t r r lat tu to the diam eter f th I s l m s s l and which h l small compared with that n n l ir atr phy oc curring during adult life Comparative me s urements f the th knee f the normal knee and the diameter f the medullary canals show that the medullary anal f the n n u e l bone t always larger n par l with the thickness f the s x t l e n ..ll ea but may l actually smaller than th e medullary anal f the corre p ndin b ne f the used extremity There may also be a difference in the shape f the cr ection f the l n ...q aring sed with non u l for example the cross section of a normal used tibia is triangular in outline while the cross section of a tibia which has n t been used during the gr ing p r l m r nearly approaches a circle

The operative procedure that may be em ployed for the treatment f kn e joint disease or injury or for diagnosis f the same require the most meticulous observation of the ... of cleanliness

Operations on the knee of a tal ... th l ... tr atm nt of knee ... th ... ar e ... l ... e ca e l ... f th ... ar t e pr ... th e as ... ce ... p r ... of the joint cartilage

Operations upon the knee which have fo the object the ... rati n ... f ... c require a careful removal of the ... can la ... In ch ... th ... l a l th ... the ... d n ... In a ... th ... the femur may be f ... ith th tibia

What then of this representative ... of knee ... very ... relation of ... m ... fact

1 In ...ny ch ... al ... a ... b ... r certain ... f ... knees may be ret ... n lt normal knee ... fu ct n by appropri surgical interference

2 In certain disease processes ... tuberculosis ... operati n u n the knee offers th ... he ... meth ... Here the opera ti n ... have f ... at ... th ... e ... r ... f ark ... l ... Until such time as th treatm ... f tuber ... ... be ... ... per perfect ... l and l ... practical th ... would seem to be th best ... p ... 1

3 In certain disease processes m ... the acute infections of the knee operations to clean the joint cavity or to establish drainage ... l ... the only prom ... of co ... ervati n of knee joint function

4 Functional use of th l w r extremity may be well carried ... t ... with a st ... weight bearing knee Functional use of th l wer extremity ... inhibited ... l ... if the knee be ins ... re painful or partially functi... The danger that ... with an insecure knee are n t ... in ... ant The menace that ... l ... the li ... f an in ... l ... lual with a tubercul ... knee ... very real

5 It is possible by surgical measures to re store the lost function of a knee joint It is al ... possible by surgery ... t ... nature in heal ing the diseased knee

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BLOOD COAGULATION

The Production and Prevention of Experimental Thrombosis and Pulmonary Embolism

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It is only in the most recent years that the importance of pulmonary embolism has come to be fully appreciated as a factor in postoperative pulmonary complications As early as 1912 Wilson (1) presented figures showing that during the previous 12¼ years the total number of deaths in St Mary's Hospital had been 864 of which the fatalities from embolism were approximately 5 per cent He also stated that the mortality from embolism based on 63 573 operations was 0 07 per cent or 1 death in every 1 352 operations Since 1910 we have been repeatedly reminded of the importance of pulmonary embolism through the work of such authors as Wharton and Pierson (9) Cutler and Hunt (4) Boland (1) and Farrar (6)

DeQuervain of Switzerland (5) while discussing resection and gastro enterostomy stated that the most important causes of death—and really three fourths of the true postoperative deaths are due to lung complications—are emboli pneumonia and lung gangrene The danger of these complications depends more on the extent of the operation than on the question of anæsthesia He also stated that a good share of the patients with so called pneumonia are in reality suffering from an embolic process Farrar (6) has compiled data showing that in a series of 5 710 operations done by ten different operators pulmonary embolism occurred in from 0 19 per cent to 5 3 per cent of the cases

The incidence of thrombosis is recorded to be from 1 to 1 8 per cent Thus Franz (7) found an incidence of 1 8 per cent Klein (10) reported 70 cases of thrombosis following 5 851 operations or 1 per cent Bondy (2) reported 1 3 per cent out of 1 000 gynecological operations Ranzi (16) 1 2 per cent out of 6 871 cases and Hampton and Wharton (8) reported 205 cases of femoral thrombophlebitis out of 21 000 operations or about 1 per cent

Definitions of Terms

A thrombus may be broadly defined as (Welch 17) a solid mass or plug formed in the

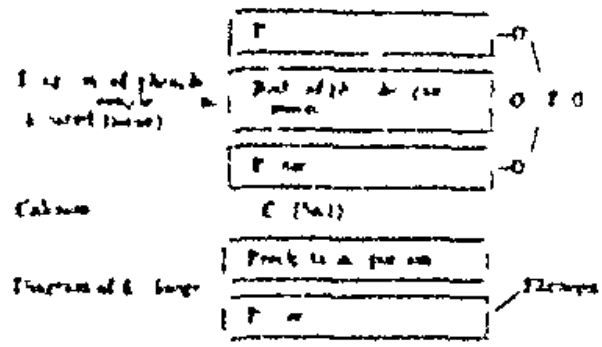
living heart or vessels *from constituents of the blood* while an embolus is the impaction in *some part of* the vascular system of any undissolved material brought there by the blood current. An embolus may be solid liquid or gaseous and may be infected or not infected. However an embolus is generally understood to be either a part or the whole of a detached thrombus.

THE ETIOLOGY OF THE WHITE FORMATION

In analyzing the mode of thrombus formation one is confronted with the outstanding question. Are the principles concerned in thrombus formation the same as those concerned in normal blood coagulation? I wish to have the opinion with such authors as MacCallum and Welch that the principles concerned in thrombus formation are similar *to those concerned in normal* blood coagulation. MacCallum (11) states: The character of the thrombus is very different in some respects from that of the postmortem clot although the principles concerned in their formation are the same except for the single mechanical factor of the streaming movement of the blood which disturbs the ordinary process of clotting and brings into prominence the feature of preliminary agglutination of platelets. While Welch (18) asks the question: Does the recognition of the described mode of development of a white thrombus necessitate a radical break (such as that made by Eberth and Schimmelbusch) with the old and still common conception that a thrombus is essentially a blood coagulum?

If it were possible to obtain blood from the body without allowing it to come into contact with injured tissue and without injury to any of the formed elements of the blood such blood would doubtless remain fluid as it exists within the blood vessel. It is possible to collect the blood of the lower vertebrates (*birds and terrapin*) through a paraffined cannula into cooled paraffined centrifuge tubes. By centrifugalizing at once one obtains a plasma with marked decreased coagulability. However if such blood is allowed to come into contact with injured tissue or if a small amount of tissue extract is added to the fluid blood coagulation will proceed at a rapid rate.

Mason (13) has pointed out that in the process of normal blood coagulation only three factors need be considered: (1) phosphatid lipine complex (normal tissue) (2) calcium and (3) fibrinogen. The simplest diagram of the process being



Various substances are capable of removing the protective portion but the most common agent is tissue injury. Coagulation then results through the combination of the three substances the doubly positive charged calcium combining through one bond to the electronegative injured tissue and through the other bond to the electronegative portion of fibrinogen. The union furnishes a mass of low hydration capacity and constitutes *the framework* of the normal clot.

From these observations one is forced to believe that compounds such as give rise to the tissue coagulant remain in the tissues (including the blood as a tissue) in the protected form and if such protection be removed they combine in the *formation of the* normal clot. The process seems quite analogous to the reaction of a fat and a calcium salt. If for example one treats stearin (glyceryl tristearate) with calcium salt no precipitation of calcium tristearate occurs that is the glyceryl fraction protects against the calcium but if such protection be removed by *hydrolysis of* the fat then the calcium and tristearate fraction will unite to form calcium stearate. The calcium stearate likewise possesses low hydration capacity.

Of the numerous observers working on thrombosis and embolism there has been no one so far as I have been able to *determine* who has called attention to the extreme potency of tissue extract in producing profound intravascular coagulation (thrombosis). Welch

(19) does mention the work of Wooldridge and briefly considers the possible role of tissue extracts but dismisses the subject with the following Considerable quantities of fibrin ferment more than are likely to be liberated in any probable circumstances in man can be injected into the circulation without causing coagulation It is evident that Welch has confused the substance called thrombin with tissue extract Attention has been focused upon the artificial substance (thrombin) which is a laboratory product and thus the potency of the normal extract of injured tissue has been lost sight of

As early as 1869 Carpenter (3) in his *Principles of Human Physiology* called attention to the previous work done on the potency of tissue extract including the following Thus M Dupuy found that the injection of cerebral substance into the veins of an animal occasioned its death almost as instantaneously as if prussic acid had been administered the circulation being rapidly brought to a standstill by the formation of voluminous clots in the heart and large vessels These experiments were repeated and confirmed by M de Blainville[1] However it remained for Wooldridge to develop the chemistry and mode of action of tissue extract Various authors since the time of Wooldridge have rediscovered the potency of tissue extract but very little has been added to his splendid observations

The present work was undertaken with the view (1) of studying more in detail the mode of action of tissue extracts in producing intravascular coagulation and (2) of determining a means of protection against such intravascular coagulation

PROCEDURE

Because of the ease of its preparation and also because of the stability and potency of the preparation lung extract was used throughout the following experiments The most satisfactory method of preparation is to grind the fresh calf lung in a meat chopper spread it thin on a porcelain slab and dry it before an electric fan When thoroughly dry the mass may again be run through a meat chopper the second grinding serving to produce a well powdered product The dry powdered tissue may be kept in an ice box indefinitely and when desired for use may be extracted for 5 to 10 minutes with three to four times its volume of 0 9 per cent sodium chloride and the solution filtered through several thicknesses of gauze The solids of such a solution will vary with the mode of preparation especially with the mode of filtration Some preparations have as high as 3 65 per cent solids

It is generally agreed that all tissue extracts possess the power to accelerate blood coagulation and that the degree of acceleration depends upon the tissue used Thus Morse (15) has called attention to the fact that several observers have noted that lung extract is among the most active of coagulants and also that the scrapings from the intima of the aorta are even more active I have repeated the work using various tissues in order to test the activity of the absolutely fresh tissue preparations and in order to standardize the technique The extracts were prepared from dog tissues as soon after death as possible Equal weights of the various tissues were ground in a meat chopper and then ground in a mortar with washed sand The thoroughly ground tissue was treated with twice its weight of 0 9 per cent sodium chloride and extracted for 7 minutes the mass being then filtered through several thicknesses of cheese cloth The activities of these extracts were all tested the same afternoon (Table I)

TABLE I —RELATIVE ACTIVITY OF VARIOUS TISSUE EXTRACTS IN ACCELERATING BLOOD COAGULATION[2]

Tissue Extract	Coagulation Mixture	Time Seconds
Brain		58 5
Lung		5
Spleen	1	50
Kidney		40
Heart	3	25
Testicle	3	3
Liver	3	59
Aorta (poor preparation)	4	45
Normal control	7	45

Fresh dog tissues suspended in all the above Fluid dog blood diluted with the same blood the following experiments were carried out

Dried calf lung		25
Lung		0
Brain	2	27
Normal control	1	0

Immediately after each experiment with dried calf blood the mixture was diluted with .cm of 0 9 per cent sodium chloride

The same tissues were then boiled for 5 minutes with 5 cm of 0 9 per cent sodium chloride was added to the boiled tissues and the mixture was diluted with



Fig Sh ng th n ture f the clot formed in the proce f impl c oul ti

It will be ob erved that on the first day the recalcified blood coagulated in 7 minutes 45 seconds and with the addition of brain ex tract the coagulation time was decreased to 58 5 seconds but with lung extract the coagu lation time was 1 minute 5 seconds However 4 days later with the same blood coagulating in 10 minutes we found lung extract more active than brain extract These results can possibly be explained through the observa tions of McLean (14) who found that hydro genated cephalin was inactive as a coagulant The double bond of the unsaturated fatty acid of cephalin can be saturated by oxygen and through such oxygenation render the cephalin portion of the brain extract inactive

PRODUCTION OF EXPERIMENTAL THROM BOSIS AND EMBOLISM

Using tissue extract four different types of coagulation were studied (1) normal coagula tion in paraffin tubes (a) without added tis sue extract and (b) with tissue extract (2) intravascular coagulation (thrombosis) pro duced by ti sue extract (3) the formation of thrombi in the external jugular with subsequent di lodgment to form pulmonary emboli and (4) coagulation at the site of in jection and subsequent examination for exten sion of the process

Normal coagulation in paraffin tubes was studied both without and with the addition of tissue extract Figure 1 is presented to show the nature of the clot formed in the proce s of simple coagulation there being no distortion of the clot by mechanical factors such as the streaming action of the blood This particular section was taken from a clot formed with the addition of tissue extract However the un treated blood yields a clot of identical appear ances The section shows a uniform mass of red blood cells with about the usual number of leucocytes scattered diffusely There are occa sional small light staining homo eneous areas which suggest collections of platelets and fibrin

Intravascular coagulation (thrombo is) was produced by intravenous administration of the saline extract of dried lung tissue All injec tions in rabbits were made in the marginal ear vein *It was observed that 1 to 3 minims of* the salt extract was sufficient to kill a rabbit in 20 to 30 seconds On autopsy these animals showed exten ive intravascular coagulation the extent of such coagulation varying with the dose used Microscopic examination of the intravascular clot reveals an entirely different picture from the simple clot formed in the paraffin tube Figure 2 is a photograph of a section through the lung and blood vessel of an animal which had received a fatal do e of tissue extract It will be noted that blood vessels are almost completely filled the con tents adhering to the vessel wall and there are columns and masses of homogeneous li ht blue staining material (platelets and fibrin) in and about which many leucocytes are en meshed (high power) In other areas the clot resembles that formed in the paraffin tube

Emboli were produced by isolating the external jugular in dogs and occluding the vessel centrally Tissue extract generally about 1 cubic centimeter was injected into the occluded vessel After about 30 second the central occlusion was released and the firm clot (thrombus) was allowed to pass into the circulation Such procedure was accompanied by decided respiratory distress but as Mann (12) has shown it is necessary almost com pletely to fill the dog s lungs with emboli in order to kill Dogs injected with lethal and



Fig 2 Section through the lung and blood vessels of a animal which had received a fatal dose of tissue extract



Fig 3 Longitudinal sections of thrombosed vein of rabbit

sublethal doses of tissue extract developed symptoms quite comparable to those of patients suffering with acute attacks of pulmonary embolism

Figure 3 is a longitudinal section of a thrombosed vein of a rabbit The thrombosis was produced by injecting tissue extract peripherally and occluding the vessel centrally After 24 hours the animal was autopsied Sections from the femoral vein show distinctly the laminated clot with leucocytes red blood cells and fibrin laid down between the laminations (high power)

Figure 4 is a photograph of a section of human lung through a thrombosed vessel and shows the laminated clot with strands and masses of fibrin and platelets About the margin are areas of simple clot resembling the test tube clot

THE PREVENTION OF EXPERIMENTAL THROMBUS AND EMBOLISM

In a previous paper (13) it was pointed out that autolysis of body tissue including the white cells will increase the amount of protective substance and thus retard coagulation In attempting to isolate an active anticoagulant from autolyzed tissue I have met with some success However the anticoagulant action of such unrefined mixtures is not sufficient to counteract the coagulant action of tissue extracts

McLean (14) in 1916 called attention to the fact that liver phosphatid when subjected to purification by repeatedly treating with alcohol yields a substance possessing anticoagulant action Since then Howell (9) has made additional observations and as a result there is on the market a substance of hepatic ori



Fig. 4.—Section of human lung through a thrombosed vessel.

gin having a very pronounced anticoagulant action.

It is possible to standardize the anticoagulant against the coagulant and the results obtained have been very encouraging. Table II is an outline of the data obtained. It will be observed that 0.0005 to 0.001 gram of the anticoagulant will protect against 0.1 cubic centimeter of lung tissue extract added extravascularly. Since the tissue extract contains not more than 3.6% per cent solid we find that 0.001 gram anticoagulant is equal to 0.0036 gram of coagulant. Figuring on this basis the anticoagulant was used for protection against intravascular coagulation and we found that 0.003 gram of the anticoagulant was always sufficient to protect against 0.3 cubic centimeter of coagulant. Without such protection the rabbits died in 20 to 30 second but with the protection the 0.3 cubic centimeter of tissue extract was injected without the least apparent harm to the rabbits.

TABLE II.—RELATIVE STRENGTH OF ANTICOAGULANT NECESSARY TO NEUTRALIZE COAGULANT.

Type of Extract Used	Coagulation Time	
	Minutes	Seconds
Dried calf lung	0	
Dried calf lung plus 0.0005 gm. of anticoagulant		26
Dried calf lung plus 0.0005 gm. of anticoagulant (poorer test)	5	15
Dried calf lung plus 0.001 gm. of anticoagulant (better)		
Heparin		

Rabbit weighing 2.500 grams requires 0.003 gram for protection against 0.3 cubic centimeter of tissue extract.

Dog weighing 7 kilograms requires 0.015 gram to delay coagulation from 4 minutes to 10 minutes. Such delayed coagulation was maintained for practically 2 hours.

The anticoagulant was next tried on dogs in order to compare the results with those obtained from the rabbit. A dog weighing 7.1 kilograms was given 0.015 gram of the anticoagulant (this amount was figured from comparative weights of the animals the figure chosen being 0.001 gram per pound of body weight). *This dose was sufficient to change* coagulation time from 4 minutes to 10 minutes and such delayed coagulation was maintained for practically 2 hours. Figures 5 and 6 record the respiration and blood pressure of the dog. Figure 5 records the findings in a dog that had been given what might be considered the therapeutic dose of anticoagulant and shows absolutely no change in respiration and circulation while Figure 6 record find about 3 hours later about three time the therapeutic dose having been given and again there is no change in respiration and circulation.

The change in coagulation appears to be *more an intravascular change than extravascular* for following the first injection the dog withstood extensive operation without any increased hæmorrhage.

DISCUSSION

From the above observations and from the statements of those best qualified to discuss the subject one is led to conclude that the

Leaching in tanc[illegible] m of [illegible]ed blood d[illegible] c cm f[illegible]
i m hi nd as sed h[illegible] m f tiss[illegible] ra t

principles concerned in thrombus formation are the same as those concerned in normal blood coagulation

Apparently the circulating blood as it passes through the normal tissues is maintained in a delicate equilibrium Various factors especially those substances capable of carrying an electronegative charge are capable of disturbing this equilibrium the most common agent being injury to the tissues The potency of such extract has not been fully appreciated for it requires only 0 003 gram of lung tissue extract to produce complete intravascular coagulation throughout a rabbit while Morse has called attention to the fact that the extract prepared from the intima of the blood vessels is even a more active coagulant

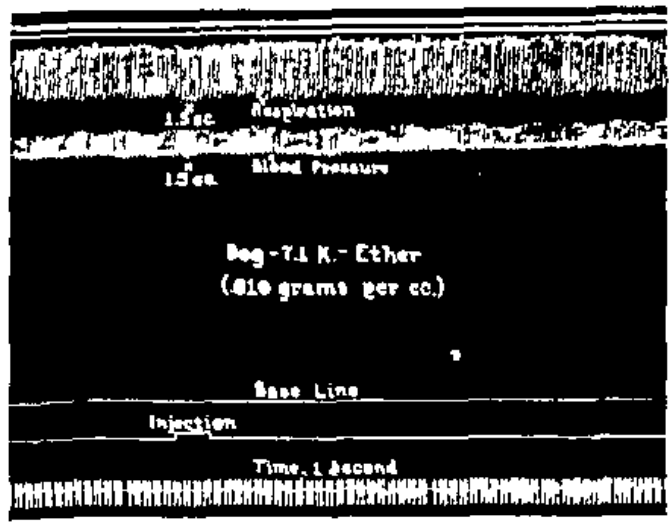


Fig. 5. Record of the respiration and blood pressure of a dog that had received a thrombus-producing dose of antithrombic agent.

The characteristic properties of blood completely qualify it to be termed a colloid solution and being a colloidal solution it seems most logical to assume that coagulation taking place in such a system should be subject to interpretations applicable to such colloidal phenomena It seems quite unsatisfactory to say that the injured blood vessel is more sticky than the uninjured vessel and that the blood constituents stick to the injured surface as flies to fly paper

Pulmonary embolism often occurs several days following operation and this fact is thought by some to differentiate clinical thrombosis and embolism from experimental thrombosis and embolism However Hampton and Wharton had a case which developed a fatal attack 3 hours after operation and another at the end of 24 hours Of their autopsy cases 85 per cent of the pulmonary embolism was found to have originated in the pelvic veins where as the authors state the vessels are large tortuous and subjected to trauma of operation are clamped and ligated The fact that clinical embolism often occurs several days postoperatively may be associated with the observations made by Wooldridge in which he showed that the stroma of

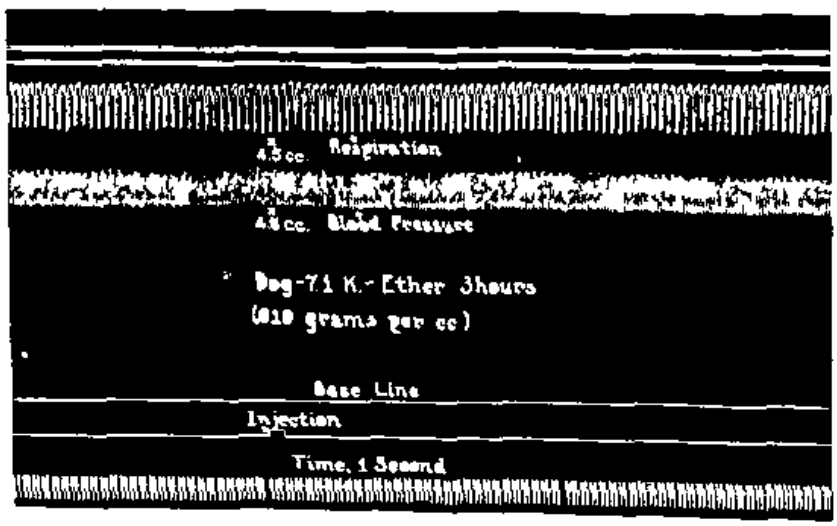


Fig. 6. Record of the respiration and blood pressure [illegible] the medicine was given in Figure 5 3 hours later [illegible] 3 times the therapeutic dose had been given

the red cell when freed from its hæmoglobin acted as any tissue extract in accelerating blood coagulation By this mechanism the red blood cells of the thrombus might contribute reactive material which would in turn contribute to the growth of the thrombus

It has been suggested that thrombus formation and the breaking down of the thrombus were due to faulty blood coagulation with a resulting friable clot However it seems more reasonable to believe that accelerated blood coagulation is at fault for I know of no case recorded as having a hæmophilic tendency and still developing thrombosis or embolism In examining the pre and postoperative records of 100 cases of fatal pulmonary embolism I was unable to find a single case showing definite autolysis of fixed body tissues or of white cells at the time of operation Only the clean cut cases without definite leucocytosis or tissue autolysis developed thrombosis and embolism

Considering that clinical thrombosis and embolism are to a certain degree comparable to experimental thrombosis and embolism I have suggested that the preparation be put up in 1 cubic centimeter ampules containing 0 100 gram However it has been found more satisfactory to put it up in 2 cubic centimeter ampules dissolved in physiological salt solution and sterilized by saturating with boric acid and 0 5 per cent chloretone

CONCLUSIONS

1 Three components fibrinogen calcium and tissue extract enter into the formation of the intravascular as well as the extravascular clot

2 Of all agents promoting intravascular coagulation none is so potent as tissue extract

3 Purified heparphosphatid has been titrated against the most active tissue extract and found to neutralize the coagulant action of such extract

4 If clinical thrombosis and embolism are comparable with experimental thrombosis and embolism the anticoagulant offering so effective protection in one should be of use in the other

5 The anticoagulant should find a clinical use as an anticoagulant in blood transfusions and also as an anticoagulant in the determination of the blood hematocrit or wherever the hypertonic action of excess salt is contraindicated

I wish t xpr s my app ci t n fo the int t sh wn n th w k by D H E Rob tso f the May Cli c It w d t h u agem t that th pr blem as d t k n while I w soc ated w th the Cli c

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MORTALITY FROM EMPYEMA IN CHILDREN

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AND

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IT is recognized by numerous writers that empyema in children is quite different from that in adults With a view to ascertaining what factors cau e this difference and how they may be combatted to improve the results of treatment a study of 268 cases operated on by the writers has been undertaken 172 of these having been reported previously (4)

The mortality of infants under 1 year suffering from pneumonia even without the complication of empyema is exceedingly high being according to Holt (3) 66 per cent During the second year it drops only to 50 per cent During the first years of life Holt reports 63 per cent mortality in 1 7 cases of empyema while Cameron and Osman (2) report 52 cases from Guy s Hospital with a mortality of 75 per cent Brown (1) reports a mortality of 4 5 per cent in 87 cases

In our own series there were 48 cases under 2 years the youngest being 1 month old In these 48 the mortality was 35 41 per cent but was much higher in infants under 1 year The disease however is not so common in the first year of life but reaches its highest incidence during the second year After the second year the disease decreases in frequency as does the mortality The patients over 8 years showed no mortality

Aside from the effect of age the type of infection is probably the next most important factor in mortality In our series of cases there were 160 patients with a pneumococcus infection showing a mortality of 15 62 per cent This includes of course the young infants in whom the mortality is high with every type of infection Thirty five patients had pure streptococcus infection giving a mortality of 28 57 per cent The cultures of 27 patients were classified under the term miscellaneous These showed growths of one or more kinds of bacteria staphylococcus pyogenes aureus streptococcus and pneumococcus appearing in combination with each other or with some other form of bacteria In this group the mortality was 14 81 per cent In 36 patients in whom the nature of the organism was unknown 8 deaths occurred a mortality of 21 22 per cent

We agree with the conclusions of Cameron and Osmar that the mortality in empyema is very high if operation is performed during the synpneumonic stage Under these conditions thoracocentesis should be practiced as a temporary measure reserving more thorough drainage until the metapneumonic stage has been reached We have very few synpneumonic cases in our series as it has been our practice to avoid operation during the pneumonia On the other hand it is unwise to postpone the operation until the patient is wasted from prolonged sepsis

Forty two of the 68 patients were operated on by the closed method that is the tube was introduced through a cannula inserted intercostally Of these patients 12 died a mortality of 28 per cent The majority of these deaths occurred in infants in whom the mortality would have been high under any form of treatment When the empyema is drained by the intercostal method it has been our practice to irrigate the cavity with Dakin s solution In two cases the cavity has been irrigated with sterile ox bile which is a logical procedure in pneumococcu cases on account of the specific bactericidal effect of the ox bile on the pneumococcus The cases however have been too few to warrant deductions being drawn Of the 42 ca es having intercostal drainage 21 or 50 per cent required secondary operations to drain the empyema adequately or to free the lung so that it might expand and close the cavity Fewer deaths result from this

secondary operation than from simple closed drainage only deaths occurring in 21 cases a mortality of 9 5 per cent

Two hundred and twenty six patients had rib resection In this group the mortality was 13 9 per cent Ten patients 4 per cent of the cases required a secondary operation for the obliteration of the cavity a fact which could practically be anticipated at the time of the first operation by observing that the lung failed to expand Such failure to obliterate the cavity did not occur in cases in which the condition of the patient warranted the freeing of pleural adhesions The low percentage of secondary operations following rib resection is a very marked contrast to the 50 per cent requiring secondary operation following closed drainage and for the most part these secondary operations were done to obliterate small cavities and there was no mortality

Ether anæsthesia was used in 153 cases Of these 27 died a mortality of 17 64 per cent Forty five operations were performed under novocain adrenalin anesthesia with 10 deaths a mortality of 22 2 per cent Fifty-eight patients were given nitrous oxide and oxygen anæsthesia with 9 fatalities a mortality of 15 51 per cent The 12 remaining were given a combination of anæsthetics and are not included

The writers appreciate that such figures are not of great significance with regard to the safety of the anæsthetic on account of the numerous other factors influencing the mortality of this disease in childhood Nevertheless they are given for what they are worth and if other surgeons will report results along the same lines eventually sufficiently large figures may be obtained to be of value

The writers believe that gas oxygen is the anæsthetic of choice except in a few selected cases in which novocain should be used The reasons for this belief are the following

Gas and oxygen are less irritating to the respiratory tract than ether and consequently less likely to be followed by a secondary pneumonia Gas and oxygen give sufficient relaxation and permit the performing of an adequate operation The patients recover from the anæsthetic sooner and suffer less shock and disturbance to metabolism The advantage of being able to resume feeding and to take fluids promptly is great

Novocain anæsthesia is not always practicable in children and frequently fails to allow the operator to separate pleural adhesions However local anæsthesia has certain merits and should be reserved for a certain limited number of suitable cases It is theoretically the safest anesthetic and the probable reason for its giving the highest mortality in our series was that it was used in the most desperate cases

We analyzed the histories of the 47 patients who died and attempted to ascertain the causes This is sometimes difficult and sometimes impossible when permission for autopsy cannot be obtained It is clear however that a late secondary pneumonia was the commonest recognized contributory cause of death This occurred certainly in 9 cases and possibly in more As a rule the pneumonia developed more than 10 days after operation The earliest case was recognized 5 days and the latest 21 days after operation In 5 of the 9 cases ether had been used in 2 gas and oxygen and in 2 novocain and adrenalin

Two patients had purulent pericarditis and 1 patient had tuberculous meningitis Acute otitis media was a complication in 5 cases but probably not a cause of death but rather an indication of progressive fatal sepsis of infants Definite pyæmias occurred twice Sudden unexplained death possibly the result of embolus occurred twice in children who were apparently convalescing satisfactorily The remainder of the cases showed no demonstrable causes of death other than the evidences of sepsis and toxæmia

CONCLUSIONS

Empyema in children has a moderately high mortality in our experience and in that of every other surgeon who has reported an appreciable number of cases The mortality is highest during the first year of life After the eighth year the mortality should be low and in our series vanished

The next most potent factor in mortality is the type of the infective organism Streptococcus hæmolyticus yield the highest mortality of the common kind of infection

Synpneumonic operations should be avoided as should too belated operations Avoidance of operation before the pneumonia has resolved is a factor in the low mortality of this series

Intercostal drainage with an attempt to keep the thorax closed around the tube is the operation of choice for patients with streptococcus infection and for a few selected cases with other types of infection Rib resection with freeing of pleural adhesions to allow for expansion of the lung is the operation of choice for the vast majority of metapneumonic cases because it gives a lower mortality rate requires fewer secondary operations and yields better permanent pulmonary function

Gas oxygen is the anasthetic of choice for rib resection Novocain with adrenalin is a valuable anasthetic for use in intercostal drainage cases Ether is contraindicated

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PRIMARY BLADDER TUMORS IN THE FIRST DECADE OF LIFE

By [illegible]

BLADDER tumors in the infant are of extreme importance the prognosis is grave and the termination nearly always fatal. Hutchinson[1] has said that but few physicians encounter such tumors once and I never before two cases of primary tumor of the bladder in children under 10 years of age. Stephen Paterson[2] in *Malignant Cystic Kidney* reports primary tumors and secondary tumors of the bladder. Hueter[3] in his section mentions the case collected by Cornil. The English literature is conspicuous by the absence of dissertations on this subject. O'Neil[4] collected 11 cases of bladder tumors in the young, including all cases under 10 years of age. Kelly[5] in the previous year reported a case of sarcoma in a child 5 years old. He claims to have found only 6 cases in the literature. I have searched the literature carefully and have been able to find only 8 instances and furthermore reduction in many of the references alluded to in his bibliography. There is a possibility that I have missed a few scattered ones and that the same cases have been reported by different authors at different times, being counted as different cases. Furthermore not all the bladder tumors reported are primary tumors. I wish to add 2 more cases, 1 a myxoma and the other a rhabdomyoma.

CASE 1. The patient [illegible] admitted to the New York Hospital on [illegible] 1902. The child was fully developed, well nourished and free of pain until the fifteenth month. When the child was [illegible] months old the mother noticed that it would *strain* slightly during micturition. The flow of urine was interfered with after 6 weeks and became quite retarded and continued blood clots. On admission the patient was suffering from [illegible]

[illegible] examination was employed. There was little difficulty in passing a [illegible] The bladder was [illegible] and the point of the instrument could be seen through the abdominal wall. The bladder was [illegible] and the tumor was removed by [illegible] The tumor was [illegible] in size, irregular in shape, and had a [illegible] surface. It was [illegible] and was attached to the bladder wall by a [illegible] pedicle. The tumor was [illegible] and was found to be composed of [illegible] tissue. The patient made a good recovery and was discharged [illegible] days after the operation.

Case 2. The child, a girl, was [illegible] years old when [illegible] The mother noticed that the child was [illegible] and had difficulty in passing urine. The bladder was [illegible] and the tumor was removed by [illegible] The tumor was [illegible] in size, irregular in shape, and had a [illegible] surface. It was [illegible] and was attached to the bladder wall by a [illegible] pedicle. The tumor was [illegible] and was found to be composed of [illegible] tissue. The patient made a good recovery and was discharged [illegible] days after the operation.



Fig. 1.—Posterior perspective view of the bladder with the extended

remaining pedicle was treated thoroughly with the actual cautery. A hundred milligrams of radium were then placed for 45 minutes. The bladder was drained with a rubber tube.

The immediate convalescence was satisfactory. On the 4th day the child passed 75 per cent of the urine. At the end of 2 days the urine was all voided through the urethra, and urination occurred every 2 hours with considerable difficulty, effort and crying. The wound healed in 18 days except for a small fistula which discharged a little urine every 4 or 5 days.

The child was seen weekly, and after 8 weeks on rectal examination a tumor mass the size of a hen's egg was found in the region of the prostate. Radium was then applied externally. On July 13, August 6, September 22, and November 1, 1800 milligram hours were given without any change in the size of the tumor. In December the tumor filled the pelvic cavity, infiltrated the suprapubic wound, and appeared in the form of reddish lobulated ulcerated areas 5 centimeters in diameter around the fistula. The roentgen ray did not reveal any metastasis in the bony pelvis. The child gradually lost weight and strength and became semicomatous 48 hours before death, which was reported as due to pulmonary edema. This occurred on February 6, 1923, 11 months after the primary operation.



Fig. 2.—Pedunculated tumor mass protruding through the bladder neck.

Description of tumor.—Grossly the specimen consisted of several spherical or ovoid masses of tumor, the largest of which measures about 6 centimeters in its greatest diameter. These masses are loosely attached to the narrow pedicle which was attached to the anterior wall of the bladder. The surface is smooth and glistening and of a pale yellow color and shrinks when exposed to the air. There are several small areas of hemorrhage into the tumor. The tissue has a gelatinous myxomatous appearance throughout. The consistency is very soft and jelly like. Blocks were cut for histological examination from the pedicle and several different masses of the tumor.

with the upper half of the vesical orifice and roof of the posterior urethra was made. Care was taken to include the external sphincter. To prevent recurrence a wide margin of apparently normal bladder tissue was removed with the tumor (Fig. 4). The wound healed in 18 days except for a small fistula which discharged a little urine every 4 or 5 days.

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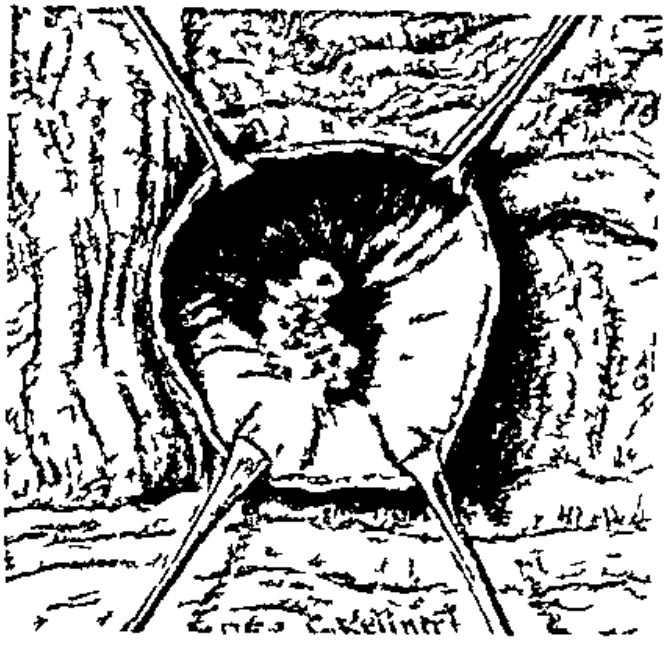


Fig 3 Pelvic tumor in natural wall

Microscopic note (Dr Moise) Several sections from different portions of the tumor and its pedicle were studied The findings are fairly uniform in all sections The sections show that the surface is covered with several layers of epithelium The deeper layers are cuboidal or columnar in shape and are arranged perpendicularly to the surface The superficial layers have a flattened arrangement form The nuclei are quite large and oval in shape showing only slight variations from one another The basal layer is quite regular in outline and sharply demarcated from the underlying tissue There are a few areas particularly in section through the pedicle in which apparently isolated nests of epithelium are seen within the stroma however this is a relatively inconspicuous feature The main portion of the tumor is the stroma which is myxomatous in character Just beneath the mucous membrane it is quite cellular in appearance The cells are oval to fusiform in shape with round or spindle shaped pyknotic nuclei In the deeper layers the cells are relatively scanty and are situated in a very pale pink staining matrix The cells vary somewhat but the majority are spindle or stellate in shape with narrow fibers extending from either pole The nuclei are moderately pyknotic No mitotic figures are seen In some areas there are a considerable number of blood vessels The relative amount of cells and stroma varies in different areas

Final diagnosis Lymphoid myxoma of the bladder (photomicrographs Fig 5 and 6)

Description of specimen obtained at second operation

Gross the specimen consists of a portion of the bladder wall measuring about 7 by 7 centimeters In the center of the specimen there is a numerous small polypoid nodule resembling the original tumor These nodules vary from 1 to 3 centimeters in diameter

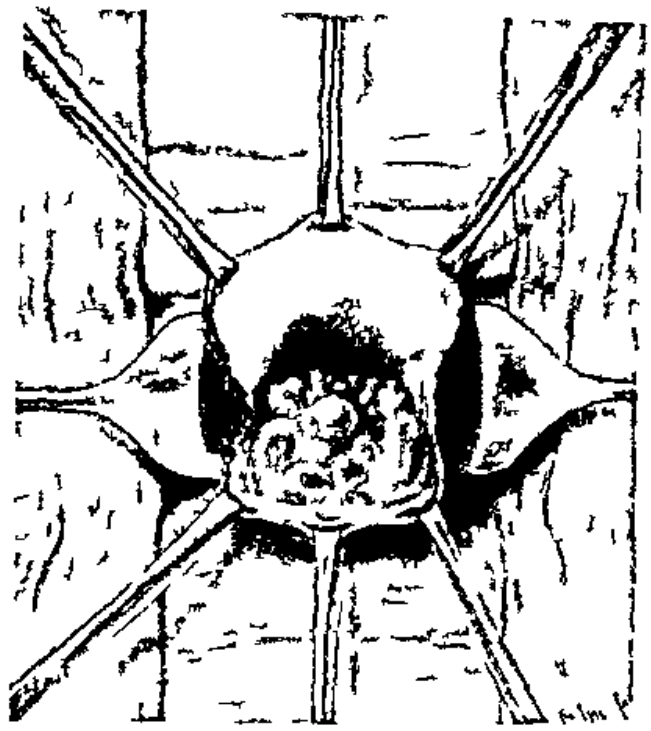


Fig 4 Recurrence after 6 weeks

to 0 5 centimeter in diameter Their surface is smooth resembling the bladder mucosa The consistency of the nodules is soft and elastic On section the tissue resembles a myxomatous growth There is no evidence of deep infiltration in the wall of the bladder Several blocks were cut for histological examination

Microscopically the picture is similar to that seen in the first specimen The bladder wall is not invaded by the tumor which is growing along the surface of the muscular layers

CASE 2 The patient a boy 21 months old was admitted to the New Haven Hospital August 18 1919 with a complete retention of urine The family history was unimportant The child was a full term baby with normal delivery whose general condition had been excellent up to 3 months ago when it began to have dysuria with considerable blood in the urine For 3 days previous to admission the child voided only a few drops of urine

Examination The child was crying and was very irritable as if it had a great deal of pain *The vital signs* were normal The skin was pale The cervical and inguinal lymph glands were moderately enlarged The abdomen was somewhat distended in the lower half where a definite rounded mass extended from the symphysis pubis to the navel This tumor was smooth symmetrical dull to percussion and resembled a distended bladder The patient was catheterized with complete disappearance of the *tumor mass after* the removal of 400 cubic centimeters of urine The genitalia were edematous but otherwise normal Rectal examination revealed in the region of the prostate an irregular globulated mass about 4 centimeters in diameter



Fig 5 Photomicrograph low power showing tumor growth in bladder muscle tissue extending among the muscle layers

Laboratory findings Hæmoglobin 45 per cent white blood cells 10 800 The urine contained much blood and was infected with bacillus coli

Operation was performed August 22 1919 The bladder was opened by the suprapubic route A grape like mass filling the bladder was found attached to the trigone This mass was removed by curetting it away from the bladder wall The area of attachment was treated with the actual cautery and the bladder drained with a rubber tube The convalescence was good for the first 10 days at which time the child was removed from the hospital against advice

The case was followed by the social service department The patient was admitted to another hospital and a second operation performed 4 weeks after the first The child again left the hospital against advice and died 3 weeks after the second operation

Small lobules were sectioned for microscopic examination Two kinds of tumor were readily seen to have existed together One section stained heavily while a small rounded portion stained lightly with a few darker staining areas scattered within it The heavier staining tissue was composed of dense tissue with broad strands of muscle fibers the cross striations and nuclei of which were prominent The intervening dense tissue resembled adult fibrous tissue with few nuclei There were a few lymph spaces The blood vessels were small and numerous No bladder musculature was seen in the specimen The lighter staining portion was composed of loose cellular myxomatous tissue with here and there muscle fibers There were many thin walled blood vessels in this portion of the section Mitoses were not seen The surface of the tumor was covered with several layers of pavement epithelium the deeper layers being short and columnar in type

Diagnosis Rhabdomyoma (Figs 7 and 8)

Previous to the development of the cystoscope Gurlt reported 16 637 tumors of



Fig 6 Photomicrograph high power showing myxomatous

various tissues with only 0 39 per cent involvement of the bladder but since the advancement of the newer methods for diagnosis the percentage according to Guyon has arisen to 4 78 per cent Duzan reported 182 tumors of various organs in infants but did not find any in the bladder Picot in estimating the organ frequency in infants affected by tumor growth places the urinary bladder seventh We must accredit to the French the honor for collecting and reporting the statistics upon this disease Albarran Chivorre Dellac in 1892 Miriage in 1894 and Concetti in 1900 reviewed the subject up to the beginning of the twentieth century at which time about 35 cases were summarized Table I will give an idea as to the rarity of this tumor in comparison with bladder tumors in general

ETIOLOGY

The diversity of opinion as to the cause of bladder tumors indicates that we do not know

TABLE I —THE INCIDENCE OF INFANTILE BLADDER TUMORS COMPARED WITH THE TOTAL NUMBER OF BLADDER TUMORS

Y	A h	T l number f bl d	I f
900	Alb rran	52	0
1900	C ett	41	38
19 2	Ju l l	14	1
19 3	W ts	1	
9 5	C rd er	369	2
19 6	B rg r	116	0
917	C r ghty	4	0
19	B rra g r	3	
922	L r	2	
192	S h ll	333	
1923	Y u g	38	

the exact etiology Albarran who has written by far the best treatise on the subject does not approve of Cohnheim s hypothesis that bladder tumors are derived from embryonic structures Bard s theory of monstrosities of the cell development is difficult to accept The fact that a few of the tumors are associated with infection and calculous formation has led some to believe in the theory of irritation but it is conceded by most urologists that *irritation i a result and not the causative* factor Fuller believed since a great number of the tumors were found to arise from the *base of the* bladder or near it that irritants secreted by the kidneys and deposited at the base of the bladder might possibly be considered a cause The microbic theory has always had a place in a certain number of cases such as in those patients infected with Bilharzia hematobium As far as can be ascertained heredity plays no definite part in these tumors Thompson believes them to be congenital To say that tumors in the bladders of infants are of congenital *origin is only* a method of expressing our ignorance concerning their etiology for we do not know what influences or forces have brought about this abnormal cell development

TABLE II —ALBARRAN S TABLE SHOWING AGE AT WHICH BLADDER TUMORS DEVELOP

A	N	M l	F m l
	6	5	
1 0	3		
3	6		5
3 4	26	8	8
4 50	43	34	9
51 60	84	7	
61 7	58	54	4
7 80	6	6	
Tot l	5		4

Age Albarran s table will perhaps give the best conception of the age when bladder tumors develop (Table II)

Geraghty youngest patient in his series of 145 cases was 15 years of age Albarran in 232 cases found 6 in the first decade of life Young in a total of 380 cases of bladder tumor records the youngest patient as 15 *years of* age *There are very few bladder* tumors reported in the second decade so I wish only to consider bladder tumors in patients 10 years of age and younger Of the 64 bladder tumors in infants which I have compiled 18 (27 per cent) were found in the second year

TABLE III —SHOWING AGE AND SEX IN 64 BLADDER TUMORS

Age in years	N	Male	Female
1	8	2	4
3		7	4
4	9	3	6
5	9	6	3
6	2	2	
7	6	5	
8	2	0	
9	4	3	
		2	
A f u		S f es g	

Sex The sexes are more equally involved in infants than in adults the ratio being 2 to 1 in the infant and 5 to 1 in the adult in favor of the male In this series of 65 41 were males and 22 were females *the sex of not being* given (Table III) Sims reports the only colored child a female of 3 years

Pathology The striking feature about tumors in the bladders of infant is the presence of mesothelial neoplasms and the absence of epithelial growths The reverse is not true in the adult although we do find a great preponderance of epithelial structures In 52 bladder tumors Albarran did not find any epithelial tumors below the twentieth year One case 4 years old is reported by Smyth as



Fig. 7.—Photomicrograph showing the rhabdomyomatous nature of the tumor.

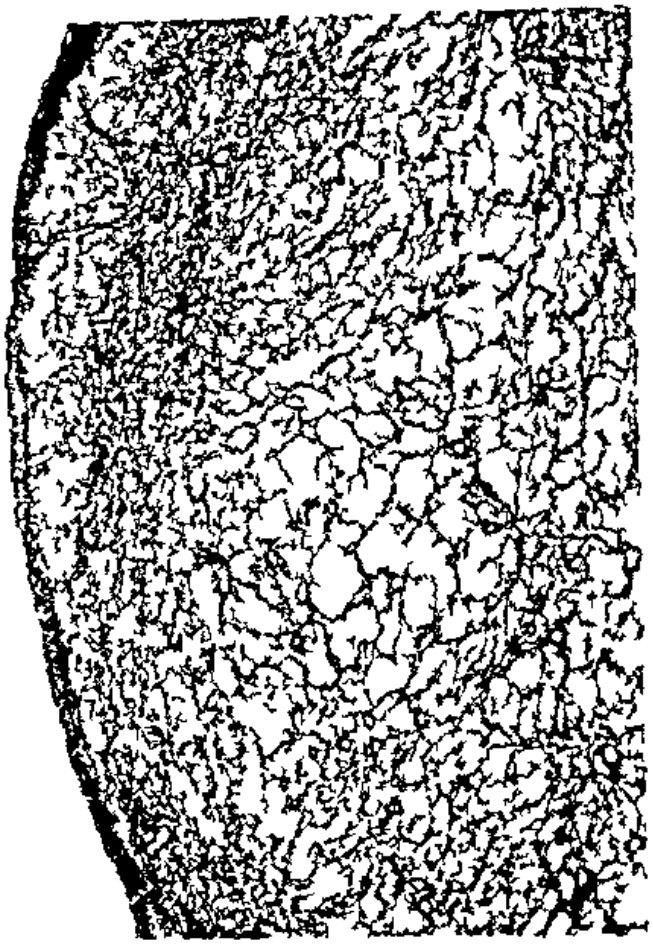


Fig. 8.—Photomicrograph showing the myomatous nature of the tumor.

a medullary cancer with a question. Concetti believes this to be not an epithelial but a connective tissue tumor. The frequency of sarcomata, myxomata and myomata points to the mesothelial tissues for their development. Billroth reports a myxosarcoma the only case in which the tumor took origin in the musculature. This must be an exception for in the opinion of the majority of the authors the growths originate in the mucous and submucous layer. Shattuck and Huesler report a rhabdomyxoma and rhabdomyoma respectively. Martini reports a dermoid cyst in a newborn child of 10 days. Charbon and Legendrinck report the only papilloma in a male of 3 years. Grossly most of these tumors are polypoid in type and appear as rounded elevations of the mucous membrane with a more or less constricted base.

TABLE IV.—BLADDER TUMORS IN FIRST DECADE OF LIFE.

	Cases	Per cent
Sarcoma	37	56.9
Myxoma	16	24.5
Fibroma	5	7.6
Rhabdomyoma		3.0
Polyp	2	3.0
Dermoid		.5
Papilloma		1.5
Myoma	1	1.5

Sarcoma.—The most common tumor in the infantile bladder is the sarcoma which comprises 56.9 per cent of the cases. These are divided by different pathologists into sarcomata, myxosarcomata, fibrosarcomata and lymphosarcomata. For convenience the author has included all the different sarcomata under the caption of sarcoma. Of the 66 cases here reported 37 were sarcomata, 24 in males and 13 in females. Albarran quotes 51 cases of sarcoma, 7 of which are found in the first decade of life. They occur throughout the span of life but the largest number are found

in the first decade and before the *fifth* year The position of the growths is mainly on the trigone and when on the wall hang in folds knobs or clusters like grapes Targett states that all these polypoid growths which are attached to the mucous coat of the bladder and variously described as mucous polyp fibrosarcoma fibromyoma myxosarcoma and the like should be described as sarcoma The cells are either round or spindle shaped with varying amounts of loose intercellular more or less homogeniously staining material Blood vessels are thin walled and are often numerous

Myxoma The myxoma is the second tumor in the order of frequency Albarran state that pure myxomata are extremely rare and further that there is a great diversity of personal opinion in the study of these tumors microscopically He does not cite a case of pure myxoma but thinks that they may be a form of sarcoma most often seen in female infants probably because they protrude through the urethra Malherbe states Myxoma of striated muscle fascia and of certain viscera is usually malignant and equivalent to sarcoma while in the mares breast bone and nervous tissue it is almost always benign Ewing further remarks that as a rule malignant myxomata fall readily into the class of myxosarcomata but does not mention myxoma of the urinary tract except in the hilus of the kidney The myxomata are usually found on the trigone near the orifice although one was found on the posterior wall They frequently traverse the urethra in the female and appear at the vulva by buttonholing the urethra They are lobulated soft smooth and rarely ulcerate They are usually single and are of a pedunculated gelatinous crystalline nature and shrink when exposed to the air They recur rapidly as I noted in the author s case in which the roof of the posterior urethra with a wide margin of bladder tissue was removed at the second operation Grossly one cannot tell which is tumor and which is normal bladder Histologically they are composed of a loose cellular structure with many large blood vessels not unlike the gelatinous substance of the umbilical cord The surface is covered with squamous epithelium

The sarcomata and myxomata are both very malignant *They do not form* metastases through the blood stream and *lymphatic* channels but spread by extension into the adjacent tissues and rarely to bone Infrequently abdominal lymph nodes are involved Darling reports a case with *metastases* in a retroperitoneal gland the size of a mustard seed Death is caused by local disturbance and by ulceration with subsequent *infection* and pressure on the ureters resulting in uremia

The fibromyxoma is an entirely different type of tumor It grows much more slowly is not as vascular is more often located on the posterior wall attains an enormous size with long pedicle and is relatively benign Schatz believes that they are a transition type between the villous polyp and the myxoma

Myoma Only one true myoma was found in this series while 2 fibromyomata are included They are benign tumors and histologically belong to the adult instead of the embryonic type Albarran found 7 such tumors in his series It is suggested that many of the old reports of fibromata were confused in the adult male cases with prostatic hypertrophy These tumors are of slow development usually single and located on the posterior wall

Rhabdomata The pure *rhabdoma* is probably a rare tumor Shattuck in 1909 reports a rhabdomyoma Huesler considered his case a rhabdomyoma and the author has found such a name more appropriate for the second case reported They appear as lobulated growths on the wall of the bladder Microscopically strand of muscle fibers are seen running through the soft gelatinous myxomatous tissue Their course is like that of sarcoma and myxoma

Fibromata and fibromyomata Fibromata and fibromyomata were found 5 times These tumors have long pedicles and are usually single Two of the 5 recovered showing the greatest percentage of cures of any except the polyps

Papilloma A single case of papilloma is described by Charbon and Legedanck Two months after its removal there was a recurrence which protruded through the wound

It seems hardly credible that this was a true papilloma but rather a polypoid fibrosarcoma or some malignant growth as papillomata are epithelial structures which are more apt to be seen later in life

Polyp Two polyps are reported one by Koll a simple polyp and the other by Robitshek a telangiectatic fibrous polyp Both were about 2 5 centimeters in length with a fibrous stalk Both of these cases recovered so that they must be considered clinically benign tumors

Dermoid Martini reported one case in a newborn child dying of anuria on the tenth day The urethra was imperforate The ureters emptied in a normal anterior wall while the posterior wall was covered with hair it being interpreted as an inclusion at the time of the formation of the cloaca

SYMPTOMS

As in adults so in children the main symptoms of bladder tumor are (1) hæmaturia (2) pain and (3) disturbance with urination While hæmaturia is often the initial symptom it is not so common in infants because the tumors are not epithelial tumors and are less likely to ulcerate The clinical picture may be marked by frequency difficulty incontinence sleeplessness etc Eleven of Concetti s 42 cases in infants and children showed an initial hæmaturia The character of the hæmaturia i often spontaneous periodic rather than constant many times profuse and resistant to treatment especially if sounds or catheters are inserted as was done in the earlier cases When infection takes place in the bladder hæmaturia is more prone to follow The tumor surface then becomes eroded and hæmorrhage may become a grave symptom

The pain is usually not constant in infants It is variable in intensity and nature and often referred to the end of the urethra and the lower abdomen Frequently it is very severe especially if the tumor is situated on the trigone The soft polypoid masses of the myxoma do not cause the pain that is so often seen in papillomata of middle life Tenesmus is much more pronounced in infants than in adults Those tumors which are extruded through the urethra are associated with great pain due to obstruction and the full bladder Dellac states that in some cases the pain is only temporary at the end of urination or at the time of catheterization In the adult the pain is associated with cystitis Children may suffer from chordee

The *trouble with urination* is one of frequency tenesmus urgency incontinence and retention depending on the form size and location of the tumor Neoplasms of the posterior wall do not cause as much disturbance as those at the vesical orifice and trigone The urethra may be completely obstructed by the tumor growing into it or momentarily obstructed so as to cause an intermittent urinary stream If it is on the trigone frequent bladder contractions may be present associated with great urgency, hæmaturia and dribbling In other words we may expect symptoms which will correspond to various grades of obstruction from very slight to complete retention of urine Stone in the bladder gives practically the same symptoms as indicated by the attempts of physicians to make a differential diagnosis with the aid of sounds and even then when a tumor is covered with phosphatic deposits the diagnosis is wrongly made Urinary infections may produce a similar clinical picture of dysuria frequency vomiting diarrhœa and prolapsed rectum

DIAGNOSIS

To determine what conditions might cause this clinical picture was a problem before the cystoscope came into use Infections and calculi are the most common pathological entities Stones were considered much more common in boys and tumors much more prevalent in girls This fact however is not borne out in the study of this series of cases for the male sex is twice as prone to tumor growth In girls the passage of tumor particles or the protrusion of tumor masses through the urethra or vagina gives positive evidence of its presence The pain in the tumor cases is very severe and is accompanied by a great deal of tenesmus and dysuria The pain radiates to the external genitalia and in some cases to the hypogastric region and is just as frequent at night as in the day time

Change in bodily position makes no difference in the difficulty of urination in cases with bladder tumors while it often is an aid to urination in cases with calculi

Abdominal palpation reveals a mass in the bladder region It may be the bladder distended with urine or with the tumor as in each of the authors cases Rectal examination should always be an aid to the diagnostician Chivorre strongly urges that this procedure be not forgotten and states that bimanual palpation is an important asset such as was used by Pheninger and St Germain Covillard in 1639 recorded the first pre operative diagnosis for bladder tumor by sounding and noting the presence of *un corps dur et solide* not a stone Although this case was not an infant such procedures were often carried out in infants to determine the presence or absence of a stone This means of differential diagnosis although nearly 300 years old may justly be carried out today as it was then Hæmorrhage with marked anæmia and swelling and œdema of the external genitalia may be present

With the newer methods of diagnosis we are apt to forget the two senses of sight and touch and thoughtlessly overlook salient maneuvers which may clinch the diagnosis These may however now be supplemented with cystoscopy so that a definite and accurate diagnosis can be made Koll in 1911 cystoscoped a 13 months old male child who had a polyp but he failed to make a diagnosis until the bladder was opened The author therefore has been unable to find any case other than the first reported in this paper in which a cystoscopic diagnosis was made and confirmed by suprapubic cystoscopy Infant cystoscopy now helps in the making of a correct diagnosis of kidney and bladder pathology in those cases in which hæmaturia pyuria or some other disturbance of urination is a prominent symptom The roentgenogram for calculus is fairly satisfactory and the cystogram may be advisable in a few cases where cystoscopy can not be carried out because of the lack of instruments

COURSE

Bladder tumors in infants run a very rapid and progressive course The duration is usually from 1 to 5 months without surgical interference The authors first case gave a history of urinary trouble for 2 months at the end of which time the tumor was the size of an orange and completely filled the bladder *Hæmaturia is marked in some instances causing* a severe anæmia gastro-intestinal disturbance vomiting diarrhœa emaciation sepsis and uræmia The myxomata are extremely rapid in progress as the authors first case showed a very large tumor 6 weeks after removal of the primary growth Even after what was thought to be a complete removal at the second operation the recurrence was extremely precocious Sarcomata are slightly less rapid in growth but very malignant The myomata fibromata polyps and dermoids are benign in nature Of the 66 cases reported only 9 per cent were cured Those which were reported cured were 2 polyps 1 fibroma 1 fibromyoma and 1 polypoid sarcoma and 1 fibrosarcoma

TREATMENT

The occurrence of bladder tumors in infants is so infrequent and their nature so malignant that it has been difficult to cope with such lesions intelligently Not more than three authors have reported 2 or more cases Statistics show a 91 per cent mortality regardless of the various types of surgical treatment which have been attempted all with equally poor results Guersant first used crushing instruments Marsch and Birkett tied ligatures around the bases of the tumors and then excised the tumor Lostalot and Pernel twisted off the tumors by means of passing sounds *per urethram* Bryant reports success with this treatment in 1 case Morgan advised suprapubic excision while Fenwick and Chaffey preferred extirpation by the perineal route Concetti reports 19 cases operated upon with a 100 per cent mortality either directly operative or from recurrences Of the 6 recoveries 5 were operated upon Two were sarcomata which were resected The others were excised and were doubtless benign tumors

The application of the modern treatment for bladder tumors in he infant has not been reported *Cautery radium* X ray and total

TABLE V—CASE HISTORIES FROM THE LITERATURE

	Author	Date	Age	Sex	Location of tumor	Operation	Result	Lived after Operation	Type of Tumor
	Albarra	80	?	F	Trigone	?	Died		Polypoid myxoma
	Albarra		4	F	Ureter	Extirpation	Died	4 days	Myxoma
3	Bullard	98	9 mo.	F	Trigone	Ureterovesical fistula	Died	7 mo.	Fibroosteosarcoma
	Bullroth	89		?		Ureterovesical fistula	Died		Myxosarcoma
5	Bickett	85	5	F	Anterior wall	Ureterovesical fistula	Died		Fibromyxoma
6	Bryant	86	3	F	Anterior wall	Removed with sound	Cured		Fibromyxoma
7	Bristow	88	4	F		Suprapubic	Died		Sarcoma
8	Chaffey		3½	M	Anterior wall	Ureterovesical fistula	Died		Lymphosarcoma
9	Chaubard and Legendre	87	5	M	Trigone	Suprapubic with perineal	Died	mos.	Papilloma
	Chevrotier	88	3	M	Trigone	Papillotomy	Died	Immediate death	Myxoma
	Chipault	8.6	5	M	Trigone	Papillotomy	Died		Sarcoma
	Cotterill	900	9 mos.	F	Trigone	Suprapubic	Died	4 mo.	Sarcoma
3	Crile	899	5	M			Died		Fibromyxoma
	Crosse	835		M		Suprapubic	Died		Papillomyxoma
5	Darling	905		M		Suprapubic and prepubic	Died	4 mo.	Papillomyxoma
6	Della Vedova	80		M	Trigone	Suprapubic	Died		Myxoma
7	Deschamps	79		M		Suprapubic	Cured		Fibrosarcoma
8	Dittel	883	7½	F	Trigone	Perineal	Died		Myxoma
	Dittrich	889	9 mo.	M	Trigone	Papillotomy	Died		Sarcoma
	Doerfler			M	Posterior wall	Removed with sound	Died		Fibromyxoma
	Eisch	80	?	M		Suprapubic	Died		Sarcoma
3	Eisch	894		F		Suprapubic	Cured		Fibroma
	Froehlich	903		F	Anterior wall		Died		Myxoma
5	Gould	90	5	M	Anterior wall	Suprapubic	Died	3 days	Lymphosarcoma
6	Gourd	90	5	M		Suprapubic and prepubic	Died	9 days	Sarcoma
	Guelides		6½	M		Perineal	Died		Sarcoma
8	Guisa	868	mos.	F		Crushed	Died	6 days	Fibrosarcoma
9	Hessel	905	½	M		Lithotrity	Died		Fibroma
3	Hessel	905	7	M		Perineotomy	Died		Myxoma
	Judd		7½	F		Perineotomy	Died		Myxoma
	Kafemann			?		Perineotomy	Died		?
	Kleinschmidt	8 5		M	Anterior wall	Perineotomy	Died		Myxoma
3	Kroll		3 mos.	M	Anterior wall	Papillectomies	Cured		Polypoid sarcoma
35	Lange	883	5	F	Wall	Suprapubic	Cured		Polyp
6	Levrat	89	7	M	Trigone	Perineotomy	Died		Myxoma
37	Lobstein	90	7	F		Perineotomy	Died		Myxoma
8	Lohnstein	8 6	3 ½	F			Died		Sarcoma
3	Lostalot-Bachoué	888	½	M	Orifice	Suprapubic	Died		Sarcoma
	Mayo Robson		4	M		Suprapubic	Died		Sarcoma
	Mersheimer	87		F	Trigone	Suprapubic	Died		Myxoma
	Mershall		½	M	Posterior wall	Suprapubic	Died	6 mos.	Lymphosarcoma
	Mitchell	874	New born	M		Perineotomy	Died		Myxoma
4	McCosh	905	9	M		Suprapubic	Died	d y	Dermoid cyst
5	Mitchell	885		M	Anterior wall		Died		Sarcoma
	Mitchell	90		M			Died	4 days	Lymphosarcoma
	Owen	8	6	M	Trigone		Died		Sarcoma
9	Owen and Bland-Sutton	8	3½	F	Trigone		Died		Sarcoma
	Parmentier	8		M			Died		Myxoma
	Thoce	89	6½	M	Trigone	Sound	Died		Sarcoma
5	Ulf	8		F			Died		Myxoma
	Pauchet	888		M	Trigone	Suprapubic	Died		Sarcoma
53	Rabbeth	9	½	M	Trigone	Suprapubic	Died		Sarcoma
5	Rampel	885		M	Trigone	Suprapubic	Died		Telangiectatic fibropolyp
5	Reay	85	3 mos.	M	Trigone	Suprapubic and prepubic	Died		Sarcoma
56	Schabock	88	5	F	Trigone	Perineotomy	Died		Fibromyxoma
57	Schaub	909		M	Trigone	Suprapubic	Died		Myxoma
58	Schwartz		3	F	Trigone	Suprapubic	Died		Rhabdomyoma
59	Simon	896		F	Trigone	Suprapubic	Died		Sarcoma
6	Smith	8		F	Wall	Suprapubic	Died		Myxofibroma
6	Solomon	88		F	Trigone	Perineotomy	Died		Sarcoma
6	Southam	894		M	Trigone	Suprapubic	Died		Sarcoma
63	Southam	8 4	6	M	Trigone	Suprapubic	Died		Sarcoma
6	Tilley	8	½	M		Suprapubic	Died		Myxosarcoma

cystectomy remain untried The base of the tumor and the adjacent bladder mucosa in the author s first case were thoroughly treated by diathermy after the greater part of the tumor had been removed Radium was applied at that time but even then a recurrence in 6 weeks was evidence that the treatment had been inadequate A second resection with a good margin of apparently normal bladder was followed by massive doses of radium externally but even this did not prevent again a rapid recurrence of the tumor There is only one other method for treatment and that is total cystectomy as recommended by Albarran Darling in 1905 suggests total cystectomy but this seems like a radical procedure for an infant and would result in a very doubtful future The author s patient lived

longer after operation than any other patient with myxoma recorded Whether the tumor was at all retarded by the extensive excision and subsequent irradiation is to be questioned However it may be a beginning in the right direction Since so vigorous treatment resulted in failure it is logical to believe that nothing short of a total cystectomy with dissection of the urethra would give an effective cure

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EXTRAPERITONEAL INGUINAL HERNIA OF THE BLADDER WITH SPECIAL REFERENCE TO THE RÔLE OF THE PREVESICAL FAT[1]

By LOUIS CARP M D New York
I t t m S g ry C lleg f Phy d S g C l mb U ty

VESICAL hernia occurs infrequently and it is perhaps for that reason that it is very often overlooked at operation and unless due caution is observed an accidental injury of the bladder may be the first reminder of its presence

HISTORY

As long ago as the eleventh century Albucasis (1) described bladder hernia and Sala (69) wrote of this condition in the thirteenth then followed communications by Guy de Chauliac (16) in the fourteenth and Felix I later (62) of Basle in the sixteenth century Two hundred years later Verdier (79) wrote a classic on the subject and from then until 1889 practically no observations of importance were recorded Isolated cases mentioned by Moynihan (58) were reported by Percival Pott John Hunter and Astley Cooper To quote Moynihan the rarity of recorded examples is due it would seem rather to a want of pertinent observation than to the infrequent existence of cases Brunner (10) in 1889 Aue (4) in 1891 Alessandri (2) in 1901 and Eggenberger (24) in 1908 made important contributions Previous to 1896 about 200 cases had been reported Jaboulay and Villard (41) in 1895 made a working classification of the anatomical types of bladder hernia

STATISTICS

Bladder hernia is four times more common in the inguinal than in the femoral region and according to Watson (81) in 19 4 occurs in 1 per cent of all cases

Brunner (10 1889) gives the following resumé

	H rn t mes	Bl dd H rnia
L as-Ch mpon è e	75	2
Kronle	76	
Bas n	6	
Hab	200	
Corazza	0	1
M a	3	6
Mo tegn cc	500	4

Coley and Hoguet (18) in 1918 mention extrusion of the urinary bladder seventeen times in 6 7/6 operations for hernia Becker (8) in 1899 found that each fourth inguinal or femoral hernia involved the bladder because in the separation of the fat this organ was encountered Lotheisen (49) in 1898 says The more exact the stripping of the sac quite up to the deep epigastric artery the more likely will cystocele be discovered especially in its earlier stages Brunner (10) in addition states that in liberating the sac of a large hernia the tip of the bladder is frequently drawn in and he speaks of this condition as an operative bladder hernia He therefore advises against pulling on the peritoneal sac C L Gibson (32) in 1897 al o stressed this point It is interesting to note in this connection that Floerken (30) very recently (1922) in 83 cases of inguinal herniæ found 13 per cent involving the bladder In no known case was there any urinary disturbance Eight times the lateral vesical ligament (obliterated hypogastric artery) was encountered and this finding was the basis of the diagnosis

ANATOMY

When distended the bladder assumes a fusiform shape and when emptied it contracts and recedes into the pelvis in a flattened conical form The anterior and lower lateral portions of the bladder are devoid of peritoneum and are attached to the adjacent pelvic structures by areolar tissue Next to the stomach it is the largest hollow viscus in the body and is suspended superiorly by the urachus being fairly firmly fixed at its base The bladder is movable and thus capable of being carried in part to any of the hernial openings The relation of the bladder to the various hernial fossæ is shown in Figure 1

CLASSIFICATION OF BLADDER HERNIÆ

In looking through the literature the classification of Jaboulay and Villard (41) seems to

[1] Read t The S rgic l Sectio N w Y rk Aca lemy f Med in Decembe 7 9

be generally accepted with occasional variations I think that a correct understanding of the anatomical relations of the bladder to the hernial sac and peritoneum will best be obtained by a glance at Figures 2 and 3 The types are

1 The intraperitoneal variety in which the bladder is completely surrounded by peritoneal sac

2 The paraperitoneal variety in which the bladder is partially surrounded by peritoneal sac which may in some instances be very small

3 The extraperitoneal variety[1] in which the bladder has no relation to a peritoneal sac because there is none

Authors do not agree as to the relative frequency of the types and many of the cases described are not clear as to the peritoneal relations but apparently the most frequent type is the paraperitoneal Brunner (10) in 1889 and Finsterer (29) in 1918 do not like the extraperitoneal classification they think that a small sac is nearly always present but not seen Lotheisen (49) in 1898 in 69 cases found 7 per cent extraperitoneal but based his conclusion on the fact that the bladder is mesial to the deep epigastric vessels Roznatovski (68) in 1910 considered the intraperitoneal type a true hernia and the other two false Eggenberger (24) in 1906 in a review of 110 cases found 17 inguinal extraperitoneal herniæ Zavyaloff (84) in 1913 places the extraperitoneal form at about 3 per cent Gibson (32) in 1897 writes that the bladder may represent all the hernia that exists —a hernia of the bladder in the strictest sense According to the nomenclature of Duret (22) in 1883 this is a cystocele without serous sac ' Fargin Fayolle (25) in 1902 says that the bladder hernia without a serous sac exists as a reality Hutchinson (40) in 1923 states It is obvious that vesical hernia may be primary i e the pouch alone projects through the ring (I think always the femoral in this case) and may be entirely or mainly devoid of sac This latter variation has frequently been classified as extraperitoneal

The rel lso ype f tr perit eal bladd h b h h ev
dopme n h rn se se f lla n h group d co id o I
called by G ron l [3) H u pr vesicali ra stretali vesic
rape t h Th bl dd trud di ec l hrough h bell
f the rect m scl nd h f it g th f sc d m scl f h
ec

ETIOLOGY

Moynihan (58) in the Arris and Gale lectures for 1900 gives the following causes for possible vesical extrusion through th anatomically weak spots in the abdominal wall

Permanent vesical distension the increase being also in the transverse direction thus bringing the bladder into relation with the inguinal fossæ Investigations carried out by English in 1877 suggest to him an abnormal obliterated hypogastric artery in which the premature involution of the vessel may lead to the formation of strong peritoneal folds which render resistance to the backward distension of the bladder considerably greater than to the lateral The bladder slowly widens out and reaches the internal abdominal ring more readily than under normal conditions Long continued overdistension would give the necessary thinning of the bladder which would permit of engagement of the bladder in the internal abdominal ring

Pelten (27) states that pregnancy interferes with the upper movement of the bladder especially if it is not well fixed According to the researches of Alessandri (2) in 1901 on cadavers when the bladder is distended with about 500 cubic centimeters the extraperitoneal portion has a greater tendency to come in contact with the inguinal and femoral rings The amount of fat present about the bladder determined how easily it could be stripped from it Thus the peritoneum was more difficult to strip from the posterior and superior surface of the bladder than from the lateral It was hard for Alessandri to produce a diverticulum of the bladder by pulling on the prevesical fat Apparently his cadavers were not fresh Karewski (42) in 1905 working on fresh cadavers dilated the inguinal rings and injected 100 cubic centimeters of fluid into the bladder It then could be felt through the hernial openings When 50 cubic centimeters were injected the bladder could be seen in the openings More filling did not influence widening of the bladder If the prevesical fat and peritoneum were grasped and traction made a finger like diverticulum of the bladder could be seen A ligature however could not be passed through the ad

herent fat without taking in the wall of the bladder In the femoral hernia the bladder when full lay closer to the ring and was more easily injured The larger the rings the more danger of injury to the bladder On the basis of the foregoing a vesical hernia may be real or apparent depending on whether the bladder is filled or dragged upon by pre vesical fat

Moynihan gives as a second cause motor insufficiency of the bladder with atrophy of the wall

As a third cause he mentions laxity of the abdominal wall and fourth increased intra abdominal pressure This is greater in men under ordinary conditions but greater in women during pregnancy (Machevnin)

Moynihan gives as the fifth cause a drag upon the bladder wall by prevesical fat

McAdam Eccles (23) says The bladder is normally surrounded and its muscular wall often infiltrated with fat This prevesical fat is continuous with the adipose tissue which extends along the spermatic cord and with that which passes up into the region of the kidney It would appear that in some ex amples of hernia of the bladder there has been a drag on the bladder wall by this fat as it lies in the inguinal canal and so there has come to be formed a hernia of the lateral wall of the viscus in much the same way in which a ven tral hernia is sometimes formed in the linea alba It is interesting to note that this view was held by Verdier (79) as far back as 1769 and was subsequently stressed by Pellatan (61) Monod and Delagenière (57) Gueter bock (38) Gibson (32) Lotheisen (49) Barom (69) Beale (7) Ferdinando (8) Gruget (37) Machevnin (52) Zavyaloff (84) Glueck stahl (35) and Oliva (59) Other authors Keate (43) Lambret (45) Cheeseman (17) assign to the fat the function of a path finder for the oncoming bladder Jaboulay and Villard (41) consider that the lipome herni aire does not act as a point of fixation but favors the descent of the bladder par glis sement i e the fat facilitates the separation of the bladder from its peritoneal covering in such a manner that the organ no longer fixed can easily abut against the inguinal ring It is however easy to see that the adherent bladder could hardly follow unless it were dragged upon by the lipoma Rivalta (66) in considering the etiology in his case stresses as do most authors the great accumulation of fat which preceded the bladder His view is clear and convincing The lipoma main tains a constant relationship between the distended bladder and the inguinal fossæ greatly overcoming the resistance of the over lying fascia by gliding and by means of trac tion favors the descent of the bladder in the form of a diverticulum (lipocystocele) This becomes more attenuated by increased trac tion and pressure until it finally emerges from the external inguinal ring The macro scopic appearance of the diverticulum is emphasized by Gueterbock (38) Beale (7) and Machevnin (52) They note that it is thin and long the attenuation being evidently produced by constant traction of the lipoma over a period of years Macready (53) ex presses an analogous view when he says that extraperitoneal bladder hernia is to all ap pearances an outgrowth of subperitoneal tissue

A number of writers however believe that bladder herniæ are congenital Moynihan (58) says Felix Plater was at a loss to under stand how an organ usually so fixed in the true pelvis could come to be outside the abdomen Mery looked upon the hernia as congenital in origin During the early years of life the bladder is an abdominal rather than a pelvic organ and any congenital defect would one might think be calculated rather to induce hernia during those years than in later life when the bladder is settled in the pelvis Michels (56) in 1893 in discussing his case remarks The patient has never had any trouble with his bladder during his life and I think it must have been a congenital diverticulum He makes no mention of prevesical fat Homer I Ostrom (60) in 1911 states It is more probable that either a congenital diverticulum formed in a consider able number of instances exists or because of a circumscribed thinning of the bladder walls this muscular structure becoming attenuated the organ distends unequally and bulging at that spot results Casanello (12) in 1913 stated the bladder hernia was congeni

tal because the herniated portion had a wall of normal thickness and constitution and because the patient had given no symptoms of urethral or vesical trouble both of which are present in the acquired form The last statement I think does not hold Putza (64) in 1913 in reviewing his case says *The bladder diverticulum which I found must* have been a congenital affair Stein (74) in 1913 states that the pathogenesis of bladder hernia is still unknown That some are congenital is evidenced by an analogous condition in the fetal bladder as shown by Watson However it is generally believed that they are acquired secondary to some congenital defect in the bladder wall Stein had the diverticulum which he resected examined pathologically and the tissue proved to be bladder with however a complete absence of epithelium Watson (81) in his book makes the statement I believe the diverticula are usually congenital when the neck of the sac is very narrow and the walls thin

There is no question that some bladder herniæ may be congenital Corner and Rowntree (19) believed that their remarkable case of extraperitoneal crotal bladder hernia in a year and one half old baby had a congenital abnormal attachment of bladder to gubernaculum testis *The hernial protrusion* was present from birth In the other cases that have been mentioned however I hardly believe that the congenital theory is convincing I feel that the one previously mentioned viz that the bladder hernia is produced by traction of prevesical fat is far more tenable and the following case of complete extraperitoneal inguinal hernia of the bladder is reported as further evidence for that view

CASE I (Author's case) Dorothy S who first came under observation in December 1920 was then 44 years of age married and complained of an inconstant and painful lump in the right inguinal region from which she had suffered for 10 years and which she thought was a result of a strain in lifting She had five children and had had two mis car

T t mpt p d o f perma nalgo dis o l mal would mea ha h ern l ingu nal ll h ve be d ta d th pr esical f dragged po d h immobil ed keep d th ng Cl l with h ech th pa hol ey h h ma could be p od d l ll b mposs) f h f t t glide bec se f i fixa o d so th ould lly engag th bladd h mal b rac o l ddi o th ho iso tal po f the q adruped tisc hia

riages and was subject to attacks of hysteria Otherwise her past and family histories were irrelevant

At first the attacks of pain in the groin lasted for 10 or 15 minutes with intervals of several weeks between them The lump could be reduced by her physician who told her she had a hernia which needed operative intervention The lump appeared more and more frequently sometimes as often as three or four times a week and in the second half of the decade of her symptoms she also had vesical disturbance during her attacks namely urinary tenesmus There was no hematuria or pyuria Reduction of the mass the size of a walnut was effected by taxis posture and the application of hot water bags She finally sought operative relief

The main points of her physical examination were her nervousness a very marked visceroptosis a very lax abdomen exquisite tenderness over McBurney's point and a large right external inguinal ring Here however on repeated examinations there was no impulse or mass to be felt

We have here a history of an incarcerated lump in the right inguinal region lasting 10 years which between attacks gave no symptoms or signs During the last 5 of these 10 years there was however evidence of bladder disturbance indicated by the urinary tenesmus during the attacks With no mass or impulse in the inguinal region it was quite evident that there was no peritoneal involvement and that therefore the prevesical lipoma and bladder came down extraperitoneally in the nature of a sliding hernia Cystoscopy was suggested but refused

The lax abdominal wall the visceroptosis and the increased intra abdominal pressure caused by the chronic constipation together with ascent of the bladder out of the pelvis with urinary retention undoubtedly were contributory factors in bringing the prevesical fat of the bladder into relation with the inguinal fossa

Her doctor corroborated her report of a lump during her attacks and operation was decided upon Proceeding as in herniotomy (Dr A J Landy assisting) the external oblique fascia was found to be very thin the pillars attenuated and all the structure lax no here was there any evidence of a peritoneal sac or even a peritoneal dimple On pushing aside the conjoined tendon there was exposed a mass of prevesical fat elongated and œdematous the size of a hickory nut and attached to it below as a thick sac 3 by 3 centimeters which from its muscular appearance from its protrusion through Hesselbach's triangle from behind the pubis and from the urinary history pointed very strongly to the probability of this sac being the bladder There was a distinct fibrous ring at its base which was apparently produced by repeated neareterations Inasmuch as it was a little difficult to push the diverticulum back and keep it reduced and further since it was not deemed wise to leave the patient with a diverticulum the field being clean the diverticulum was resected The opening in the bladder about 1 centimeter in

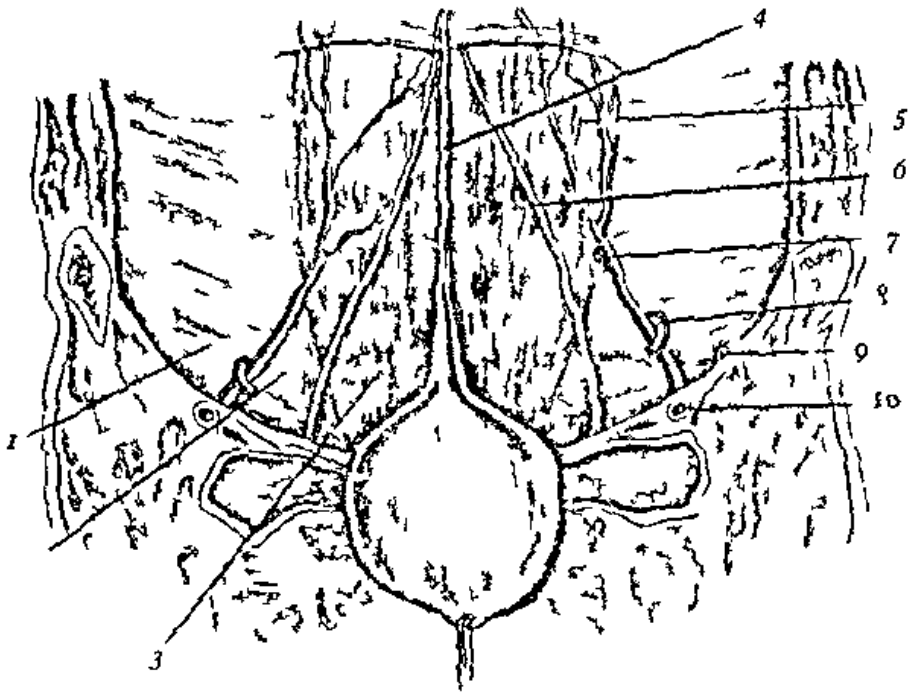


Fig Ve f po t rior u fac of a t or abd mi l w ll h wing th i guin l f ssæ 1 m d lle i g inal fos 2 i t rnal gu l f a 3 ura hu 4 e tu m scle 5 bl t rat d hypoga t c a te y 6 d p ep gastr artery ro d f gam nt 8 I part lig ment 9 e t nal iliac a t v 10 (Redrawn bv D J Al o from G G D 1 4ppl d 1 1 mv)

diameter was closed v ith three rows of chromic cat gut The aponeuro is of the external oblique was ap proximated to Poupart s ligament accor ing to the Andrews Coley techn que A Pez er catheter v as inserted into the bladder The patient ha ing given sy mptoms and signs of a chronic appendicitis the appendix as removed through a r ght rectus split ting incision

Reference to the a companying illustration Figure 4 v ill show the operati e findings

The patient made an uneventful recovery except for cystitis which yielded to treatment Cystoscopy 1 month after operation showed a moderate cystitis with the area of the bladder suture red and velvety There were no di erticula to be seen She has been well e er since with no recurrence of her attacks or a hernia

The anatomy of this hernia will be more evident by a glance at Figure 1 The posterior view of the anterior abdominal wall from the peritoneal side shows the bladder the urachus the obliterated hypogastric artery the deep epigastric artery the *recti muscles* Poupart s ligament and the round ligament coming around the deep epigastric artery The internal ingu nal fossa is between the urachus and obl terated hypogastric artery the *middle* inguinal fossa bet een the obliterated hypogastric artery and the deep epigastric artery and the external inguinal fossa lateral to the deep epigastric a tery Evidently the extraperitoneal p rtion of the bladder v as dragged by prevesical fat through the middle inguinal fos a thus really producing a direct *sl di g hernia* That there were repeated incarcera tions of the bladder is shown by the fibrous ring at *the ba e of the sac*

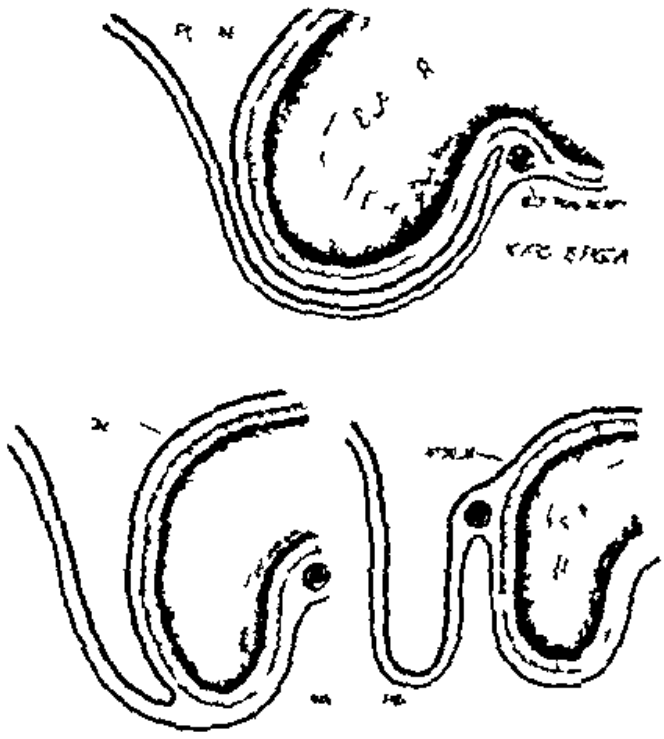
The following is an abstract of cases of extraperitoneal inguinal bladder hernia in the strict sense of the classification[1] In some of them however it may be that a peritoneal sac was present but not recognized

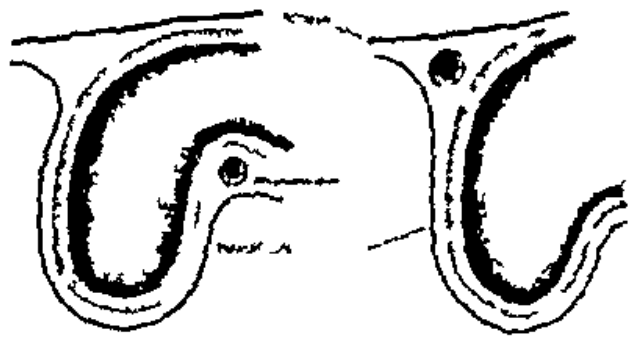
CASE 2 Thormann (1841) Cited by Martin (54) A man age 52 for 12 years had right inguinal hernia which for 1 year was irreducible Very often he had pain and obstipation In the last attack he had pain and no movement of the bowels for 3 day At operation an elastic sv elling was found and incised The wound of the bladder was diagnosed only after operation Healing resulted

CASE 3 Scott (1868) A mulatto woman age not given had right inguinal hernia v hich was in carcerated and could not be reduced At operation an incision was made down to the div erticulum of the bladder which could not be reduced until a stricture at its base was divided The bladder vas recognized by putting a sound into it Primary union resulted

CASE 4 Michels (1894) A man age 48 had bilateral inguinal hernia On the right side an empty sac was reached tied at its neck and cut away

[1] Th some cases i th l a b d raper l h h fove m h b f d be paraperit eal





Figs. 2 (left) and 3. Anatomical types of the hernia threatening the peritoneum. Left, transparent hernia. Right, partial hernia—the peritoneal sac and part of the bladder. Right, intra- and extraperitoneal hernia. (Illustrations by Miss Emma Enberger—drawn by Dr. J. Alanz.)

The stump was put back into the abdomen and the inguinal ring closed. Twenty-four hours later the patient began to complain of pain in the hypogastrium and the urine contained much blood. The abdomen was opened and a wounded extraperitoneal part of the bladder was found and closed. Uneventful recovery followed.

Case 5. Felizet (1894). A boy aged 12 had a swelling on the left side the size of a pigeon's egg which increased for 6 months, causing pain, getting larger on effort. At operation a transverse incision was made and vessels and canal were found external to a red soft cylindrical mass. This abnormal sac was attacked with caution. The cellular tissue was dissected and strands of longitudinal and circular fibers were encountered. The external pillar was found rudimentary, while the internal was totally absent. We were dealing with some viscus—hernia but without a sac. The viscus was pushed back into place and the wound closed. No comment on fat is specifically made.

Case 6. Rabineau (1836). Cited by Poupault (61). An adult male had had an inguinal hernia for 3 years. The hernia vanished at micturition. At operation a lipoma was found. The bladder which had been mistaken for the sac was lacerated. Hæmaturia and urinary retention followed. Cure.

Case 7. Thompson (1898) found at operation in a 45-year-old man who had a left inguinal hernia of a long time a semi-elastic swelling which he fixed. He recognized it as the bladder and made sure of his diagnosis with a catheter. The hernia was twisted off and the bladder diverticulum sloughed away on the ninth day. The urinary fistula closed in one month.

Case 8. Luz (1898). A 3-year-old girl had a small diffuse reducible swelling in the left inguinal region for 10 weeks. The diagnosis was not made

At operation a firm thick walled sac with size of a horse chestnut was found. It was possible to feel an introduced catheter in the diverticulum. No peritoneal sac was found. The diverticulum was reefed and invaginated. Healing resulted.

Case 9. Roche (1899). A 40-year-old man had a right inguinal hernia for 14 years, forced down the size of an ostrich egg in which the diagnosis was not made. At operation a gray sac was found which was incised and found to be bladder. This was repaired. There was a temporary fistula which eventually healed.

Case 10. Spotswood (1899). A 35-year-old woman had an irreducible inguinal hernia with no urinary disturbance. At operation a sac was found but a fat and bladder hernia was found and opened by mistake. This was repaired and a cure resulted.

Case 11. Martin (1900). A 51-year-old man since 18 years of age had had reducible right inguinal hernia the size of a walnut. There was sudden incarceration with retention of urine and tenesmus and vomiting. At operation in dividing the sac coverings layers of the sac which was adherent he encountered a vascular structure into which could be passed a catheter through the bladder. The fat and bladder were pushed back and repaired with drainage.

Case 12. Cerulano (1900). A 51-year-old woman for 10 years had a tumor in the left inguinal region which at the beginning was reducible. For 4 years it was irreducible. There was no difficulty in emptying the bladder. In straining herself there suddenly appeared a tumor the size of an egg with pain and faecal vomiting. On examination there was found in the inguinal region a tumor the size of an transverse elastic slightly tender compressible. It was immovable. Over the skin no pulsation could be detected in the swelling. The diagnosis was [illegible]. At operation the tumor [illegible] was found adherent to the omentum which was isolated with the exception of the peritoneum. A catheter in the bladder confirmed the diagnosis. The diverticulum was resected at the base and closed and healing took place.

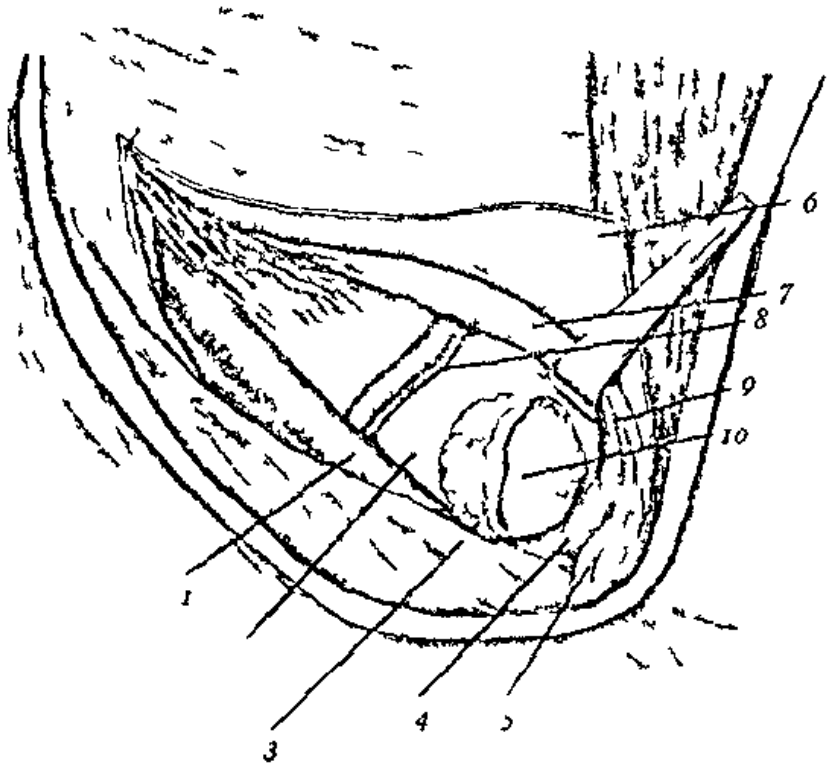


Fig 4 Drawing showing the operation with base of the bladder diverticulum was found distinct constricting fibers encircling at which point the bladder had been repeatedly incised at the external inguinal ring The hypocele has been undercut and half resected in order to show the bladder *hernia* 1 *R* ectus abdominal ligament 2 transversalis fascia 3 Internal part of the ligament 4 Inferior epigastric artery 5 spine of pubis 6 external oblique muscle 7 internal oblique muscle 8 deep epigastric artery 9 vas deferens 10 bladder attached to hypocele (Drawn by Dr A J Monzo)

CASE 13 Loupault (1901) A man 33 years of age had a right inguinal hernia The fat was a part of the swelling and was attached to the bladder The bladder wall was cut open On operation there was found what was thought to be a sac This proved to be a fatty envelope composed of bladder wall itself

CASE 14 Poupault A man age 33 had had a hernia for 15 years with no bladder symptoms

Operation On incising the tissues the bladder was come upon not surrounded by any sac and recognized by the arrangement of its muscular fibers No fat is mentioned

CASE 15 Poupault A man 54 years of age had had a hernia since the age of 33 Micturition was facilitated by pressure on the hernial mass At operation there was no sac A urinary diverticulum 10 centimeters long was cut off and sutured

CASE 16 Cosentino (1901) A woman age 26 married at 17 became infected with gonorrhœa from her husband 2 years before At examination gonorrhœal endometritis was found A swelling as large as an almond had persisted in the right inguinal region for 6 months disappearing when the patient was in the recumbent position It was slightly painful on effort There was no urinary trouble except hæmaturia 2 days before operation At operation a *small sac was found* in the canal mixed with an abnormal fatty layer which was pulled downward in *order to isolate it* The sac was incised in search of intestine or epiploon and a small quantity of liquid was exuded the sac was found to contain no viscus *and to* extend horizontally toward the pubis a bladder hernia was suspected and a catheter introduced which could be felt in the abdominal *wound* A permanent catheter was introduced into the bladder and reduction was instituted

CASE 17 Goerl (1901) A 40 year old patient had for a half year bladder symptoms with pyuria *There was a left* inguinal hernia the size of an apple which had to be squeezed in order to help urination At operation an extraperitoneal bladder hernia was *found with* fat and induration which was mistaken for carcinoma This was incised and then sutured

CASE 18 Alessandri (1901) A 63 year old male for 4 years had noticed a reducible left inguinal hernia the size of a small nut which diminished with *urination* At operation a hernial swelling was found covered with a small amount of fat This was mis*taken for* a sac and incised with immediate escape of urine A catheter was passed up into the diverticulum A peritoneal sac could not be found The

wound was sutured drainage was instituted and a permanent catheter left in bladder Recovery followed

Case 19 Alexander A 51 year old officer had noticed a bilateral inguinal hernia for 14 years for which he wore a truss It disappeared when he was lying down There were no urinary symptoms At operation the hernial swelling was incised and urine obtained A catheter passed per urethram was visible in the wound No peritoneal sac was found The bladder was sutured and drainage instituted A similar condition was later encountered on the right side *The diverticulum was resected* and a Bastianni closure effected

Case 20 Lucas Championnière (1902) A 40 year old man had a left inguinal hernia At operation fatty tissue were found in the external ring and a hole was torn in the bladder accidentally The rent was sutured and the bladder replaced There was a temporary urinary fistula with eventual healing

Case 21 Lawson (1902) A 34 year old servant had left inguinal hernia for six months At operation *over the swelling fat was encountered and* under this was a very thick sac This was incised and found to be a bladder diverticulum The bladder was closed drainage was instituted and healing followed

Case 22 Barone (1902) A man of 55 years had two direct irreducible inguinal hernias On the right side the pain was referred to the right kidney There was pain with a full bladder relieved on emptying it At operation on the left side a direct bladder hernia was *found extraperitoneal* with no sac surrounded by fat and fascia by the muscular structure

Case 23 Barone A man of 58 years had bilateral inguinal hernias On the left side the inguinal pain was referred to the left kidney At operation on the right side an inguinal hernia was found on the left side was an extraperitoneal bladder hernia which was reduced A Bastianni operation was done and cure effected in 10 days

Case 24 Fargin Fayolle (1902 3) A man age 55 *referred by* Dr Jacqué came in on July 4 1902 with signs of irreducible hernia (epiplocele) At operation the incision exposed an abundant mass of fat No sac was found Further operation showed that the surgeon (Jacqué) was dealing with a bladder hernia Picqué then examined carefully the hernia to ascertain its relation to peritoneum and definitely determined that there was no hernial sac protruding

Case 25 Fargin Fayolle The author cites another case of a patient age 46 *referred by* Dr Quinard in 1902 A diagnosis of epiplocele was made At operation the incision exposed a large fatty mass Fargin Fayolle discovered that he was dealing with an extraperitoneal part of the urinary bladder which was easily reduced

Case 26 Fargin Fayolle This case of a male age 46 was reported to the author by Dr Walther A diagnosis of double inguinal hernia was made At operation a hernia was reduced the right side *On the left side there* a large amount of fat which when carefully dissected showed bladder all *There was no peritoneal sac*

Case 27 Cernezzi (1904) A man of 66 for 10 years had a right irreducible inguinal hernia the size of a small orange At operation a large *prehernial* lipoma was isolated While it was being separated a portion was cut through and it was noticed that a cavity had been opened which by the characteristic mucous membrane lining was recognized as being a diverticulum of the bladder This was impatent communicating with the bladder by a narrow *fistula Its walls were thin and adherent to the fat* which was first encountered The thinness of the wall the difficulty of isolating the diverticulum from the surrounding structures and the narrowness of the communication with the bladder made Cernezzi resect it and close the opening A Bastianni plastic was done

Case 28 Alexander (1905) A man age 74 had a bilateral direct inguinal hernia with no urinary symptoms At operation on the right side a small sac was found with a little fat *The sac proved* to be the bladder Reduction and a Bassini plastic were done

Case 29 Katerski (1905) A 52 year-old woman had had urinary frequency and frequency for many years In the right inguinal region was a reducible mass the size of a fist Cystoscopy showed a large diverticulum lateral to the right ureteral orifice A catheter could easily be introduced through the bladder into the hernia At operation fat was exposed and beneath it was a *bladder diverticulum* This was pushed back and the wound closed

Case 30 Tuecke (1905) A 25 year-old locksmith for two days had had pain about the symphysis radiating to the right There was slight burning on urination In the right inguinal region was found a reducible mass the size of a walnut dull on percussion A diagnosis of epiplocele was made At operation the fascia enclosed a sac which was covered with fat A catheter introduced into the bladder made *the sac collapse and so the diagnosis was made*

Case 31 Beale (1905) A man of 30 was admitted with right inguinal bubonocele It was more rounded than usual on coughing and was of firmer consistency At operation the cord was found drawn up through the wound and a large lipoma adherent to it It was removed but no sac was found In the inguinal canal was found an ovoid structure the size of a walnut the apex was very *thin* but the rest of the structure felt solid While making *traction some of the fibers gave way* and a small quantity of fluid escaped It was ascertained to be bladder The diverticulum was ligated off the inguinal canal was stitched up and drained

Case 32 Vanucci (1905) A man of 42 had had a hernia for 18 months Before noticing a hernia he had noticed on exertion or long walks a pain and *desire to urinate Examination revealed a hernia* the size of an egg which was diagnosed as direct inguinal hernia At operation the hernia was found to consist merely of the bladder without any sac at

all The bladder was covered by abundant fatty globules which were fibrous in appearance and very vascular The Bassini operation was followed by a cure

CASE 33 Vanucci A man of 45 presented in the right inguinal region a hernia the size of an egg easily reducible At operation under local anæsthesia the sac was found completely covered by a layer of fat which was very vascular On dissecting this fatty layer itself Vanucci discovered that he was not dealing with a hernial sac but rather with a urinary bladder During the isolation the patient had a desire to urinate There was no serous sac The bladder was isolated and finally reduced but it was hard to keep it so The Bassini operation was followed by a cure

CASE 34 Rivalta (1903) A man of 35 presented at operation on the left side three masses of fat which were thought to be the usual prehernial fat but when two of these were separated from the cord no sac could be found The third one which was compact thick and adherent to the cord internally was now cut It color its consistency and the fact that it extended into the pelvic cavity made Rivalta suspect that he was dealing with a urinary bladder This was confirmed The anterior surface of the bladder could be easily identified No serous sac was found The bladder was easily reduced A Bassini plastic was done On the right side a condition exactly similar to that on the left was found except that the bladder diverticulum was larger and more adherent to the cord

CASE 35 Zimmer (1906) A 50 year old woman had had an inguinal hernia for 14 years with painful urination Suddenly there was ischuria tenesmus and pain in the hypogastrium A diagnosis of incarceration of the bladder was made At operation the swelling was covered with normal fat and the muscular wall of the bladder was seen The deep epigastric artery was mesial to the swelling It was replaced and a closure done

CASE 36 Le Nouene (1906) A man of 39 from the time he was 28 until he was 34 had suffered from renal colic with vomiting and to this vomiting the patient attributed the appearance of hernia which he had had in the inguinal region for 7 years on the left and 6 years on the right side The tumor was irreducible but there was no increase in size even on violent effort There was frequency of urination for a long while and at the time of operation he was urinating every hour The general state was good At operation on the left side a fatty mass was found under the skin somewhat black easily separated leading toward the pubis The hernia was caught in a deeper orifice by an elastic ring At this point the hernia was very firm On pressing the mass the bladder was recognized A sound introduced per urethram was seen behind the bladder wall The bladder was pushed back as much as possible and an attempt was made to establish a musculo aponeurotic closure This was done by incising higher up than before opening the aponeurosis and external oblique Then the external lip was sutured with silk to the posterior lip of the rectus sheath which had to be cut along its external border The sutures were tightened without any difficulty and it was even possible to include some fibers of the rectus Only necessary space was left on the external inguinal ring to allow passage of the cord now rid of its fatty attachment A solid wall was obtained

On the eleventh day on the right side the canal did not enclose the sac of hernia and once more a fatty mass was found leading toward the pubis The hernia lipoma was followed by a muscular mass which passed through a very narrow opening The latter must surely have been the middle fossa for on trying to isolate the hernia more deeply the deep epigastric artery which runs along its external border was caused to bleed When the pedicle had been well isolated it appeared clearly that the hernia was made up by bladder on the left side The wall was repaired in a similar manner The patient left the hospital a week later

CASE 37 Ferdinando (1906) The patient was a man a mule driver age 77 A diagnosis of strangulated inguinal hernia was made At operation upon incision of skin and superficial fascia a fatty pad was found which covered the whole swelling Dissection proved this to be adherent to the wall of the bladder and to weigh nearly forty grams The bladder was pushed back into position

CASE 38 Ferdinando This was a case of double extraperitoneal inguinal bladder hernia in a patient age 27 The diagnosis was direct hernia with probable vesical involvement At operation upon incision the herniated part was composed of a small sac covered by a thin layer of fat When this was cautiously dissected there was found beneath a membrane which resembled and which proved to be the bladder wall

CASE 39 Corner and Rowntree (1906) This was a case of tuberculosis in a diverticulum of the bladder found in an inguinal hernia A boy of 18 months had had a swelling in the right scrotum since birth reducible on lying down no pain tenderness or urinary symptoms At operation the inguinal canal was opened and an unusual amount of dense fibrous fatty tissue was found The dissection was continued down to a thin walled sac from which flowed pale clear urine A finger was introduced into the bladder The diverticulum when isolated was 2 inches long and it was resected No peritoneal sac was found A Bassini closure was done Examination of the sac showed it to be tuberculous

CASE 40 Gruget (1908) A housewife age 45 complained of a mass in the right inguinal region At the age of 15 she noticed a mass here which increased in size and became oblong It was painful at night and practically gone in the morning On the day of admission she complained of pain in the right inguinal region radiating to the hypogastrium and umbilicus and had vomited twice There were no urinary symptoms Examination showed a right inguinal tumor the size of a nut irreducible painful

resistant and slightly movable At operation a shiny cyst the size of a small nut was exposed On raising it there was a fatty mass very adherent to the pillars and the mass was found to go downward and inward No sac could be found but the mass covered a laminated fibrous structure It was resected because it could not be reduced The bladder was sewed up

CASE 41 Charner (1909) A man 39 years of age fell on a board 13 years previously sustaining a laceration of the abdominal wall which left the tissues weakened in the right inguinal region Ten years later he had pain here There was increasing swelling reducible and pressure over it produced a desire to urinate which was reduced by micturition The patient presented himself with sharp pain in the right inguinal region and a strangulated inguinal hernia the size of a fist At operation a mass was reached which did not show any sac but which was entered during the manipulation and urine was seen to escape The mucosa was black The opening was sutured the mass was reduced and the inguinal canal repaired with drainage

CASE 42 Charrier and Charbonnel (1909) A man of 60 complained of a small painful mass in the right inguinal region accompanied by vomiting and urinary tenesmus After micturition the tumor was painless and changed in size and consistency On examination there was an irreducible mass in the right inguinal region the size of a small nut On isolating the hernia there was fatty tissue on a small oblong mass dark in color which did not have the appearance of a sac Scissors accidentally punctured this superficially and some œdematous fluid escaped but there was no opening into a sac A catheter was introduced into the bladder which could not be felt in the mass No peritoneal sac could be demonstrated An extra peritoneal bladder hernia was diagnosed it was reduced and the wound closed

CASE 43 Randall (1909) A girl of 20 noticed a small bunch in the right inguinal region It did not disappear and was painful at times and felt like a fatty growth Sometimes it was thought that an impulse could be felt on coughing There were no bladder symptoms but they were those similar to that of an enlarged tender gland At operation the mass looked and felt like a lipoma except that the walls could be moved on each other as though there were a cavity in the center The mass extended down into the inguinal canal After separating it from the adherent structures it appeared as a diverticulum of the bowels A sound passed into the bladder easily and went into the diverticulum making the diagnosis of an extraperitoneal direct inguinal bladder hernia The bladder was returned to the abdominal cavity and the wound sutured

CASE 44 Vincent (1909) A woman of 33 had six children Two years ago she noticed a swelling the size of a nut in the left inguinal region with no pain Severe pain followed The patient had noticed at the level of the bladder a severe heavy sensation the pain stopping only after urination which was accomplished by 7 or 8 attempts Examination showed in the left inguinal region a swelling the size of a nut slightly reducible and not very large in volume At operation there was seen a thin mass of fat which formed a real lipoma in front of the hernia This was dissected from the hernia and a sac was sought but there was found a thin fibro elastic membrane whose appearance and consistency led Vincent to suspect the bladder wall Five hundred cubic centimeters of fluid were injected into the bladder which showed no contractions but a capacity greater than normal Under the distention by the fluid it was noticed that the herniated bladder was drawn into the pelvic cavity The wound was sutured and the patient cured

CASE 45 Gifford (1910) In a child of 5 years (sex not given) rupture in the left side had been noticed 5 months No swelling was noted on standing upright The swelling appeared on coughing No evident rupture could be felt through the ring and the ring was not large At operation no hernial sac was present but there was a protrusion of a thick walled sac which proved to be bladder This was pushed back and the muscle approximated to Poupart's ligament

CASE 46 Gifford A man of 33 said he had a left rupture produced 3 weeks before by straining The swelling was found only on coughing and immediately disappeared At operation no hernial sac was found except a thick walled viscus (bladder) which was reduced and the muscle approximated to Poupart's ligament

CASE 47 Leotta (1910) A man of 45 after a long walk was taken with acute pain in both inguinal regions He noticed two tumors the size and shape of a walnut soft disappearing on pressure Pain increased on coughing A belt was applied for a while without relief Meanwhile the tumors kept growing slowly On examination there was an irregular oval tumor the size of a walnut in each inguinal region They disappeared on lying down and reappeared on vigorous coughing Reduction of the tumor on either side did not stimulate micturition nor did it cause any other disturbance Filling the bladder increased the size of the tumors emptying it diminished the size The diagnosis of bilateral inguinal bladder hernia was made On operation on the left side there was no hernial sac present There was a mass of fat with the bladder immediately beneath it with its thin wall and its characteristic muscular reticulum situated internal to the epigastric vessels On its upper external margin could be seen a peritoneal process which however did not descend in such a manner as to constitute a true sac but became evident only when the bladder was pulled outward The fat was removed the bladder reduced and the wound closed Similar findings and similar procedures were done on the right side

CASE 48 Lancaster (1911) A gender age 46 had an attack of bronchitis with violent cough 10 years previously during which time a hernia appeared in the left inguinal region accompanied by frequent

urination but scarce and painful at the same time Five years later a similar inguinal hernia appeared on the right side On examination in the right inguinal region there was an oval swelling occupying the length of the inguinal canal as it descended into the scrotum This was an ordinary inguinal hernia The left inguinal region presented a tumor the size of an orange which was soft and elastic could be reduced but incited the desire to urinate on reduction On the left side after incision of the skin and superficial fascia there was a reddish tumor mass covered with a thin adipose layer This ran over the inguinal canal from the internal to the external rings No sac was present The fat was dissected off and during the operation there was seen a cyst with thin transparent walls which was accidentally torn with the escape of fluid Bladder hernia was diagnosed by means of a catheter The hernia communicated with the bladder by means of a canal through which the index finger could easily be passed The diverticulum was resected and the wound closed in the usual manner

CASE 49 *Gancarini* A man of 33 came into the hospital in bad condition In the right inguinal region was an oval tumor oblique in direction emerging from the external inguinal region into the scrotum It was easily reducible but when the hand was taken away the tumor again swelled The patient suddenly died before operation Autopsy showed the bladder enormously distended with flaccid walls It presented on the right lateral anterior surface a true diverticulum which went into the inguinal canal through the internal fovea descending down into the scrotum to the bottom of which it was firmly attached There was no peritoneal sac On the left side a similar but smaller hernia was present

CASE 50 *Baudet (1911)* A man of 50 had a right inguinal hernia for many years which had progressively increased in size but grew suddenly within the last year For 18 months he had the desire to urinate and micturition was facilitated by pressure on the tumor but when pressure was released the tumor regained its original size and increased after effort to urinate At operation no peritoneal sac was found There was a round soft fatty tumor as large as an orange whose thin extremity was prolonged into the vesical fossæ behind the symphysis pubis through the middle inguinal fossa because the deep epigastric artery was to the outer side The continuity of this tumor with the pedicle through the abdominal wall gave the idea of a cystocele It was a case of the bladder being seen but sac consisting of two parts one that retained its normal position behind the symphysis the other having made its escape to the outside These two pockets were united by an intermediate canal the diameter the size of a thumb The extraperitoneal portion was absolutely devoid of peritoneum the herniated portion having a thick wall due to the superimposed layer of cellular fatty tissue The mass was reduced with much trouble This inguinal hernia was then an extraperitoneal cystocele without serous envelopment

CASE 51 *Venturi (1911)* A man age 55 10 years ago noted a small swelling in the left inguinal region The swelling disappeared when he was in the recumbent position For one year the patient had had some difficulty with urination Immediately after dinner without any cause at all the patient had an acute attack of pain in the hernia region followed by vomiting He got to bed with difficulty and noticed that the hernia was hard and tense The pain increased in intensity but remained limited to hernia In the hospital at midnight he had another attack of vomiting biliary in character At operation an incision was made over the skin and subcutaneous tissue The hernial tissue of a dark reddish color appeared and had engorged vessels all over it No lipomata or diffuse accumulations of fat were seen The aponeurosis was incised up to the external inguinal ring and the tumor was still hard tense and immovable Attempts were made to isolate it and it was noted that a pedicle descended toward the internal inguinal ring The deep epigastric vessels lay external to the tumor When the internal ring was enlarged the tumor was immediately liberated Pressing the tumor between the fingers revealed the fact that it was empty The hernia could be followed to behind the pubis and the catheter which had been introduced could be felt This confirmed the opinion that the bladder was being dealt with Radical cure followed The Bassini technique was used

CASE 52 *Domenichini (1912)* A diagnosis was made during operation Domenichini was dealing with a direct inguinal hernia and the bladder was not wounded A bricklayer of 58 at the age of 44 while lifting a heavy weight had had a sudden pain in the left inguinal region which disappeared after a short rest In a few days he noticed a swelling the size of a nut This swelling with pressure became smaller After two years following another exertion he noticed a swelling in the right inguinal region which behaved similarly to the one on the left but here the pain was so acute that a doctor had to be called Both swellings came out when the patient was in the act of defecation On taxis no gurgling could be heard The swelling was not tender it was elastic with a smooth surface except that in front it felt nodular There was no gurgling on reduction At operation on the right a swelling was found mesial to the deep epigastric artery adherent to the skin structures The usual yellowish fat was in front of the swelling On palpation the sac was elastic and more thick walled than usual The swelling extended back of the pubis and when fluid was introduced into the bladder vesical hernia on both sides was assured Reduction and a Bassini plastic were done Normal recovery followed

CASE 53 *Masera (1912)* A man of 25 at the age of 10 had noticed in the right inguinal region a small reducible hernia with no pain For three years there had been progressive increase in size and volume and

acute pain On examination there was seen medial to the inguinal canal a hernia the size of a large nut reducible on pressure A diagnosis of bladder hernia was made On operation there was on the internal part of the canal and mesial to and above the cord a *mass of fat the size of a nut* The cord was easily isolated and traction upon the fatty mass caused more herniation doubling the size of the tumor and exposed the opening through which the hernia had made its exit It was narrow and occupied mesially the lateral edge of the rectus muscle belo the superior surface of the pubis externally and above the arched fibers of the transversalis fascia and falx inguinalis Three centimeters external to the hernial ring was the deep epigastric artery Attempts to pull *off the fat which covered the hernia revealed a* rich vascular structure thin and muscular There was a suspicion of bladder hernia Water was introduced through the catheter but the volume f the hernia remained unchanged due to the small constricted opening through which the exit had been made Pressure upon the hernia with the fingers however increased the outflow of water through the catheter and confirme l the continuity between the bladder and hernia A serous sac was looked for but not found The bladder as *reduced* and the canal closed by the Bassini method The patient was cured an l remaine l well

CASE 54 Masera A man of 37 on rais ng a weight of 60 kilos felt a sensation of tearing in the right inguinal region after which there appeared a hernia the size and form of a nut On examination *there was found in the right inguinal region a hernia* the size of a pigeon s egg which enlarged on cough ing The hernia was smooth and of soft consistency and disappeared when the patient was in the re cumbent position A diagnosis of hipocele was made At operation the hernia was found form d to a large extent by a thin stratum of fat covering the antero lateral part of the bladder which al o came out a *little* into the inguinal canal by its extraperitoneal surface displacing before it the epigastric vessels and the fascia transversalis A diagnosis of bladder hernia was confirmed by following behind the symphysis pubis with the finger and by the introduction of a metallic catheter through the urethra The blad der was pushed back and the canal closed by the Bassini method

CASE 55 Bergener (1912) The patient was a *man age 50* Twenty years *before* a log had rolled over the abdomen For 10 years there had been difficulty in passing urine He had been operated on for inguinal hernia on the l ft side 4 years before For 1 month he had had a tumor in the right in guinal region the size of a walnut which was noticed only on standing up and was fluctuating At opera *tion alongside the cord a tubular sac 5 centimeters* long was found and opened and straw colored fluid appeared This was proved to be the bladder by the passage of a catheter per urethram The diverticulum was resected and hernioplasty done Po toperative course good cystoscopy showed wound well healed

CASE 56 Putza (1913) A man of 22 noticed for one year in the left inguinal *region a tumor* the size of a walnut reducible by manual pres sure constant in size When the patient coughed there was a tumor the size of a nut which rapidly disappeared on the cessation of increased intra abdominal pressure The tumor di l not emerge far from the external inguinal ring On operat n *the case was diagnosed as an inguinal enterocele* The tumor was found covered by transversalis fascia This was incised and in the mesh work of the subjacent connective tissue was f und a long body with smooth walls As this was thought to be the sac an attempt was made to isolate it from the surround ng adherent fat During this act the *tumor wall was torn* and urine escaped Th then was a blad l r diverticulum No trace of serous sac was found

CASE 57 Casanello (1913) A man 52 years old ha l a bilateral hernia The hernia on the left proved to be an intestinal hernia The one on the right having been exposed there was found a small mass as large as a mandarin with a supposed sac inti mately attached with the cord Having isolated the cord the underlying structure was identified as part *of the urinary bl dder extraperitoneal* herniated through the internal fovea The bladder wall was torn during the manipulat on and urine escaped The herniated part of the bladder communicated with the bladder through an orifice through which the index finger could be passed with difficulty The bla lder wall was sutured

CASE 58 Zavjaloff (1913) A man of 45 had a b lateral inguinal herma the left for 20 years the right for 15 years The right admitted one finger the left two fingers The right was the size of an egg the left the size of an infant head On exposing the left the sac was co ered ith fat and urine was seen to appear on taking away the t moma A cath ter was *introduced and the bladder closed* He l ng resulted

CASE 59 Cameron and Higgs (1916) A girl of 13 for months had a small painless hernia in the left groin which was not always visible Three weeks after its appearance she complained of pain over the lower abdomen on micturition On exami nation there was a *mall hernia in the left groin not* visible when she lay do n and there was no impulse on coughing On operation the supposed hernial sac was exposed and incised Thi was found to b bladder and the opening was sutured Uneventful recovery followed

CASE 60 Stincer (1917) A man of 36 as ad mitted fo right inguinal *hernia There was in the* ingu no abdominal region a swelling easily re ducible increased by cough and strain At opera tion the sac was carefully exposed The pillars of the ring and surr unding structures were very weak On inci ing th fat in front of the supposed sac no sac was found A bladder herni was suspected and accord ngly the bl dder was *filled with fluid by a* catheter and th swelling of the ngu nal r gion

increased in size The tumor was reduced and the patient was well in nine days

CASE 61 Stein (1923) A woman of 30 sexti para for one year had noticed a mass in the right groin She could reduce it by manipulation and by lying down Three days before admission she was suddenly seized with severe pain in that region and was unable to reduce the hernia At examination the patient was suffering from considerable pain In the right inguinal region was a spherical hernia tender firm irreducible and nontympanitic The urine was negative The diagnosi of an irreducible hernia seemed logical On operation a tumefaction presented itself It was a firm vascular thick walled pear shaped mass about 5 by 2 centimeters lying in the inguinal canal the narrowest part at the internal inguinal ring There was no peritoneal sac The similarity to bladder tissue wa noted A catheter was passed by urethra and the bladder emptied but the tumor in the inguinal canal re mained unchanged in size The mass was then incised and found to contain about half an ounce of straw colored fluid No internal communication with the bladder could be determined The pedicle of the internal ring was transfixed and ligated and a typical Bassini closure done Smooth convalescence followed Stein thought he was dealing with a con genital cyst of the inguinal canal a bladder hernia or a diverti ulum of the bladder Microscopic ex amination proved it to be bladder

In going over these cases one is impressed by the infrequency of a correct diagnosis Watson in reviewing 347 cases of all types of bladder hernia concludes that the diagno sis was made as follows before operation 25 times during operation 279 times and after operation 43 times

Extraperitoneal bladder hernia may be diagnosed

1 *Before operation* (1) by making a care ful history ( ) by the presence of a large ring (3) by slight impulse on coughing (this may be absent) (4) by the appearance and disappear ance of the mass (5) by the increase in the size of the hernia with a full bladder (6) by the fact that pressure on the hernia may cause micturition or passage of urine along the urethra (7) by injections of 8 per cent po tassium iodide or 10 per cent potassium bro mide into the bladder to make possible X ray of the diverticulum (Sgalitzer 7 Sennels 71) and (8) by cystoscopy

2 *At operation* (1) by the pre ence of a pre vesical lipoma (if the fat has a thin mem branous covering or sac of its own which even when opened does not permit of easy shelling out attachment of the bladder is to be suspected) (2) by the absence of a peri toneal sac (3) by the fact that the pedicle does not lead into the peritoneal cavity but behind the pubic bone (4) by the presence of a large inguinal ring (5) The sac may balloon out by filling the bladder or (6) a sound may be felt in the diverticulum (7) Urinary extravasation may be present

Where a cyst has been opened and found to contain a fluid resembling urine an acid reaction is diagnostic of this fluid as no other cyst content would give it In decomposed urine the reaction would be valueless (White ford 82) (8) The sac may be aspirated

3 *After operation* (1) by the escape of urine from the wound or (2) by blood stained urine

The bladder has been mistaken for a cyst lipoma preperitoneal fat colon omentum and hernial sac Ante operative diagnosis is difficult because the herniated portion of the bladder resembles a peritoneal sac During operation it is very frequently incised and often tied off This becomes apparent by bladder symptoms after operation Eggen berger (24) in reviewing 110 cases of all types of bladder hernia found that 18 were recog nized before operation but nevertheless the bladder was opened five times Out of 58 cases 35 were recognized during operation In the remaining cases the bladder wall was injured In 9 cases the opening was un noticed 5 becoming apparent after opera tion and 4 postmortem Salichev quoted by Roznatowski (68) made a pre operative diagnosis in 39 cases and the bladder was injured during operation 25 times In 57 cases Hermes (39) says the diagnosis was made 3 times before operation and the bladder was injured 40 times during operation Of 192 cases mentioned by Cheeseman (17) the vesical wall was recognized and avoided during operation in only 47 In 93 it was injured chiefly unintentionally In 17 out of 49 cases cited by Finsterer (29) it was incised accidentally during operation

SUMMARY

Extraperitoneal inguinal hernia of the bladder is infrequent and occurs mostly be

tween the third and fifth decades in the male and on the right side A total of 61 cases were studied and the analysis of these cases is shown in Table I

Bladder symptoms and incarceration are absent in the majority of cases

Prevesical fat is invariably present and it may be inferred from experimental and clinical evidence that this fat by traction plays the major rôle in the production of extraperitoneal inguinal bladder diverticulum

In view of this fact all lipoceles are potentially operative and should be resected when encountered on the operating table

TABLE I

	Cases	Per cent
Age incidence		
1 to 10	1	1
11 to 20	3	5
21 to 30	7	12
31 to 40	14	24
41 to 50	14	24
51 to 60	4	24
61 to 70	4	8
71 to 80		2
Not stated	2	
Sex incidence		
Males	45	75
Females	15	25
Not stated		
Side involved		
Right	26	5
Left	19	37
Bilateral	7	3
Not stated	9	
Bladder symptoms		
Present	21	35
Absent	4	65
Incarceration of bladder		
Present	13	22
Absent	48	78
Type of operation		
Resection of diverticulum without preliminary injury	3	7
Resection of diverticulum with preliminary injury	5	8
Reduction	8	50
Repair of injured bladder and reduction	15	2
Reefing diverticulum	1	3
Diverticulum left	4	7
Not mentioned	5	
Bladder Injury		
Present	25	4
Absent	36	60

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THE SIGNIFICANCE OF CELLULAR IMMUNITY IN THE DEVELOPMENT (PATHOGENESIS) AND CURE OF DISEASE

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PHYSICIANS will make greater strides than heretofore in their therapeutic efforts when they study zealously the mode of origin and the function of the defensive bodies which the human organism possesses against the production of disease For the sake of progress in this field it was unfortunate that until very recently investigators interested themselves chiefly in the nature of specific immunity and of blood immunity and valued too lightly the importance of cellular immunity Within the last few years however a movement in the opposite direction has developed In recent years many research workers have studied the problem of non specific individual and cellular immunity For the past fifteen years I have worked intensively on the subject of cellular and non specific immunity and though I have come to many conclusions which are contradictory to prevailing opinions I have been happy to note in recent years that many physicians are beginning to recognize the correctness of my theses

Many investigators in attempting to determine what structures are involved in cellular immunity have sought the defensive bodies first of all in the white blood cells others have ascribed primary importance to the endothelial cells and to the reticulo-endothelial system still others have considered the cells of the skin the most important means of defense I have come to the conclusion that all cells as well as all normal body fluid share in the defense against injurious substances and though one must not value too lightly the importance of the humoral defensive substances one must not forget that the latter are derived from the body cells The protection of the body against external attacks is a function of all the cells epithelial cells endothelial cells muscle and nerve cells cartilage and bone cells all parenchymal cells—all of them possess and form defensive bodies

At the first aggressive action a very important part is played in the defense against injurious agents by the epithelial and endothelial cells but if the injurious agents overcome these defensive outposts very important defensive measures are fulfilled by the cells of the mesenchymal tissue both by its fixed cells and still more by its mobile cells particularly the leucocytes and lymphocytes

The predisposition to many diseases very frequently has its basis in an inferior hæmato lymphocytic system for indeed the white blood cells take their origin in no small part from the latter (the lymphocytic system) Inversely a large proportion of the differences in constitutional development is based upon variations in the development of the hæmatolymphocytic organs With such organs well developed the body is very frequently in a condition to render harmless the agent of disease with imperfect development on the other hand disease is brought about by such agents The body defends itself against invading bacteria in the same manner as against inorganic foreign bodies penetrating it from without It defends itself against the products of its own metabolism and of cell disintegration circulating in the body fluids in just the same manner as against enemy tissue cells arising from adjoining tissues and overstepping their boundaries (as for example epithelial cell extending into connective tissue) Each of these invaders is foreign tissue each disturbs the structure of the connective tissue and produces as a consequence an acute inflammation which results in an increased immigration of white blood cells an increased infiltration and proliferation of lymphocytes leucocytes fixed connective tissue cells etc More remotely because of the absorption of harmful substances it produces a stimulation of function of the hæmatolymphocytic organs as well as a reinforcement of the cellular immunity

An intact covering of the body in very many cases prevents the penetration of noxæ by means of the epithelial cells If this protection is insufficient perhaps because of lacunæ in the epithelium the noxæ gain admission If the cellular defensive agents of the subepithelial connective tissue the second line of the defensive army are well developed the noxæ through this means are rendered harmless Frequently immune bodies which are dissolved in the body fluids are of assistance in this process If there is a marked poverty of cells in the subepithelial connective tissue (as for example in extensive scars in long standing chronic inflammation or in advanced age) the epithelial cells which overstep the boundary of the epithelium may advance widely into the connective tissue and increase without limit In this event other regressive metamorphoses of the connective tissue such as changes in its chemical composition in the silicic acid content the calcium content etc and frequently also a greater aggressiveness and increased proliferation of the epithelium such as occurs following trauma contribute to this advance In short the tissue acquires the predisposition to cancer

As the author was the first to point out the lymphocytes and the connective tissue cells in proximity to the epithelium are ordinarily arranged in compact lines In precancerous conditions such as in scars and in old age these rows of cells are much thinner As soon as epithelial cells have begun to invade them the body attempts to check their progress by an extensive infiltration of round cells If this succeeds spontaneous *healing occurs if it fails epithelial* cancer develops

In order to determine whether there are morphological differences in the condition of the lungs of those strongly predisposed to tuberculosis and those slightly predisposed to it in association with Dr Reiger I have first of all compared the lungs of children with those of elderly people In the lungs of young children we have found the connective tissue the so called lung stroma scant the lymphocytes and connective tissue cells in insignificant numbers In old people on the other hand the peribronchial and perivascular stroma is increased and widened and contains abundant lymphocytic deposits Numerous anthracotic foci are found in whose vicinity the lymphocytic deposit is especially abundant This abundant content of connective tissue cells and lymphocytes is one of the most important factors on which the slight predisposition of elderly people to tuberculosis is based The lymphocytic infiltration is the result of the inhalation of dust and soot and of many preceding infections particularly of tuberculosis The fact that the lungs of old people are richer than those of young people in silicic acid (conditional of course upon the inhalation of the most dust rich in silicic acid) very probably contributes to this immunization

With reference to atheromatosis of the blood vessel conditions are similar to those existing in cancer and the reverse of those existing in tuberculosis A predisposition to atheromatosis of the walls of the blood vessel is present to a high degree in elderly people to a very slight degree in young people The connective tissue of the blood vessel walls in elderly people is very poor in cells in contradistinction to the condition present in young people In the walls of atheromatous vessels there is also a primary poverty of cells though not infrequently there is adjacent to it a reactive cell proliferation In young people the blood vessel walls are protected by a wealth of cells from the products of metabolism and cell disintegration circulating in the blood stream as well as against many poisons circulating in the blood such as those resulting from indulgence in alcohol nicotine and caffeine This protection becomes less with advancing age With inadequate function of the lymphocytic organs this lack of cellular protection may develop at an earlier age injurious substances invade the vascular walls tiny areas of necrosis develop to which is added a reactive cellular proliferation etc

In chronic joint inflammations particularly in arthritis deformans the process is similar to that in atheromatosis of the vessel walls Most chronic joint infections particularly arthritis deformans are found in elderly

people In young people the cartilages of the joints are rich in cells With advancing age the cartilage cells become separated farther and farther, and their nuclei shrink The bone marrow in youth also is rich in cells in old age one finds fatty tissue poor in nuclei In the synovial membrane in youth one finds the connective tissue rich in nuclei with many accumulations of lymphocytic cells and many scattered wandering cells

In old age the wealth of nuclei in the connective tissue disappears and the mobile cells become more scant The predisposition to arthritis deformans may be accounted for in the following manner In the blood of many individuals there are frequently present substances whose entrance into the joints is injurious to their integrity Through a favorably functionating cellular immunity these noxæ are rendered harmless The atrophy of the cells of the joint cartilages of the ends of the bones and of the synovial membrane permits the entrance of these noxæ which produce destructive processes in the tissues mentioned with the associated reactive inflammation upon which the beginning of a chronic joint inflammation is based

In syphilis also the cellular defense is of great significance At my direction a blood picture was obtained of all the syphilitics in the University Clinic of Munich There was constanly present an increase of lymphocytes with a percentage varying between 30 and 63 The more pronounced the lymphadenitis the greater was the percentage of lymphocytes The eosinophilic cells also were frequently increased The increase of the latter occurred most noticeably during the course of Salvarsan treatment Manifestly the white blood cells particularly the lymphocytes and the eosinophiles are powerful agents of bodily defense against the spirochæta pallida The spleen and the lymph glands also increase in size after syphilitic infection

The immunity of syphilitics to new infections may well be explained by the fact that the syphilitic as a result of the increased function of the lymphocytic organs possesses a greater share of lymphocyte and immune bodies than the man who harbors no spirochætæ If the syphilis is cured the lymph glands the spleen and the other lymphocytic organs decrease in size the production of lymphocytes and immune bodies is decreased and a new infection with spirochætæ is made possible

In the prevention of mouth infection cellular immunity also plays an important rôle It is well known that frequently pathologic bacteria gain entrance to wounds without causing a resulting disturbance At other times similar numbers of the same bacteria result in the severest injuries To a considerable degree this may be explained in the following manner Every cell of the human body possesses a protective power against invading foreign substances Infection increases this protective power at the site of its development and causes an immigration of numerous blood cells in the area of the infection A contest thus develops between the cells and the bacteria The outcome of this contest depends mostly upon the quantity and quality of the strength of the two antagonists Powerful assistance to the protection of the tissue is rendered also by the soluble constituent of the body fluids In the female sex the cellular immunity manifestly functions more successfully than in the male This is surely one of the reasons why women on the average live longer than men In addition to this constitutional predisposition and the comparatively lesser hazard from occupational and toxic injury (a less favorable attitude toward alcohol and tobacco) play a part Menstruation pregnancy and the period of lactation all give occasion for marked activity of the hæmatolymphocytic organs During pregnancy the spleen increases in size the bone marrow becomes richer in blood There is an increase of leucocytes and of eosinophilic cells During the periods mentioned women excrete large quantities of body fluid most of all during lactation If a woman gives milk for 9 months she gives in fluids to her child more than twice her body weight In menstruation and labor large quantities of blood are lost For these losses of fluid nature attempts to overcompensate (Weigert's law) This she attains in part through an increase of the activity of the hæmatolymphocytic organs through which the cellular immunity

and the resistance of women against the pro ducers of disease are increased

With reference to treatment I have come to the conclusion that for the prophylaxis as well as for the cure of many diseases we must increase the local and the general immunity For increasing the general immunity in a number of cases of tuberculosis particularly of the cirrhotic type as well as in arthritis deformans and in many patients with ath eromatosis the production of a stimulation of the lymphocytic organs has been necessary for improving local immunity the produc tion of a local inflammation An increase of the lymphocytes and an improvement of the general health I have frequently produced by diathermy applied to the abdominal glands For this I have used Theilhaber s intestinal electrodes perforated torpedo like electrodes which were placed in the rec tum filled with 3 per cent salt solution For passive electrodes two large flat plates were laid on the abdomen and back By this means also the function of the spleen and of the lymph follicles of the intestine particularly was markedly increased In addition a venesection of ½ or ¾ of a liter of blood was often carried out which likewise in creased the production of lymphocytes and immune bodies The injection of extracts of lymphocytic organs (thymus spleen lymph glands) also proved very helpful In addition to these measures every stimulation of the large cell complexes of the body is productive of immune bodies For this pur pose the most convenient is the stimulation of the immune cell complexes of the skin through sun baths air baths hot air baths friction treatments of the skin etc Older physicians rightfully ascribed a high value to emetic and purgative treatments A part of their effect is the result of the stimulation of the numerous cells of the digestive organs produced by the medication in question The stimulation of the exceptionally numer ous cells of the lungs through inhalations is also frequently useful for example in case of tuberculosis and in the use of inunctions of mercury for syphilis where the inhaled mercu ry increases the production of immune bodies in the cells of the air passages To produce an inflammatory stimulation of the disease area and thus to effect an improvement in the local cellular immunity the local applica tion of diathermy lends itself in an exception al manner With small doses of roentgen rays one can also increase the cellular im munity Large doses of the latter are chiefly harmful since they may injure the blood vessels and the cells to a high degree and thus lessen the cellular immunity In the use of the roentgen rays the danger of an overdose is therefore a great one In the presence of cancer good results may be ob tained with similar doses particularly in preventing recurrence after operations for cancer Such recurrences have been lessened by 50 per cent as compared with formerly existing conditions For the prevention of infection due to operations particularly op erations in the abdominal cavity diathermy of the abdomen with Theilhaber s intestinal electrodes injections of novoprotin and in suitable cases venesection have recently been carried out and in this way a decrease of the postoperative morbidity has been attained In the treatment of syphilis the same meth ods associated with use of small dose of Salvarsan and mercury have been employed chiefly by myself and Rieger Only one fourth of the usual dose of Salvar an has been given The pathologic symptoms have usually become less marked in a short time in most cases have subsided completely and the Wassermann reaction in the great ma jority of cases has become negative

With reference to the manner in which the effect of non specific treatment is produced it has been demonstrated experimentally that the lymphocytes for example, which can be obtained from the peritoneal exudate of white mice after the repeated injection of red corpuscles of the sheep bring about a pronounced agglutination or hæmolysis of the sheep s corpuscles while other red blood cells are unaffected since the lymphocytes in question have adapted themselves to produc ing a specific ferment active only against this parti ular lipoid

In the method described above we imitate nature We have succeeded in overcoming the great majority of the causes of disease

of human origin without the help of specific protective methods If later after infection has developed specific methods of immunity are brought into operation they are more effective if non specific treatment has been carried out beforehand It has been definitely shown through the work of Weichardt Much and others that non specific measures also can lead to an increase of specific immunity

ANEURISM OF THE SPLENIC ARTERY

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RECENTLY Smith (1923) gave a brief description of a ruptured aneurism of the splenic artery Binder (1913) stated that there had been no collection of literature dealing with splenic aneurisms and that there were only a few cases on record Hoegler (1920) gave a description of the 15 cases he had found in the literature In a somewhat extended search of the literature in connection with a case seen in this clinic we found 40 cases and these are presented in a table with some of the more important data concerning them

Since several of these cases were successfully operated upon with removal of the spleen and aneurism we tabulated symptoms and findings It seemed possible that these might be characteristic enough to make a diagnosis so that radical treatment could be undertaken In fact Winkler (1905) stated that he wanted to add splenic tumors with splenic artery aneurisms to the list of operable spleen conditions From the results obtained in the few cases operated upon this treatment gives a good prognosis while in most of the other cases the aneurism directly caused the fatality It would seem then that if the diagnosis can be made in such a rare condition we have a very definite means of successful treatment

A brief description of the more important findings is given in a review of the various cases as well as a rather more detailed account of the case presented here

CASE 1 (Authors No 5938) A female age 48 years entered the hospital March 1921 complaining of vomiting blood for the past week following sudden severe pain in the abdomen She had also had blood in her stools She had had dyspepsia for some time and had always had some indigestion

On entrance she was markedly anæmic She vomited bloody gastric contents for several days after entrance X ray examination was not satisfactory but there was some evidence of enlargement of the liver and spleen The stomach appeared dilated and atonic and the pylorus was irregular This suggested ulcer or carcinoma but Banti's disease was also a possibility Laboratory examinations showed a faint trace of albumin in several urine specimens 1 880 000 red blood cells 30 per cent hæmoglobin (Sahli) and a normal leucocyte count Three weeks later there were over 2 500 000 red cells and 35 per cent hæmoglobin and still a week later both had again improved The diagnosis of gastric ulcer was made and the patient put on an ulcer diet On discharge she was markedly improved in every way

She returned in December because of much blood in the stools This cleared up and the patient was again put on an ulcer diet Examination revealed a rapid pulse the chest and abdomen were negative

She remained well until February 5 1922 when she reentered The day before admission she had had a dizzy fainting sensation and passed much blood in her stools followed by the vomiting of a large amount of blood Her pulse was rapid and of poor quality and she was markedly anæmic There was considerable loss of blood by vomiting and through stools for several days After February 8 her temperature remained normal the pulse 100 or more and respirations 25 or more No fluid could be made out in the abdomen As the patient was seriously ill and had lost much blood a transfusion was given on February 11 and again on the 13th The patient improved somewhat following the first transfusion but became irrational and died on the evening of the 13th the day after the second transfusion

Autopsy showed normal organs in the chest with the exception of a few patches of bronchopneumonia The peritoneal surfaces were smooth and glistening and the cavity contained no fluid. There was marked dilatation of the veins along the greater curvature of

the stomach particularly those near the pylorus A mass in the lesser peritoneal sac was attached to the stomach pancreas splenic flexure of the colon and the left kidney The spleen (Fig 1) had fibrous attachments to the diaphragm and omentum and was definitely enlarged weighing about 350 grams The capsule was tense the organ firm to the touch and dark red on section with no pulp coming away on the edge of the knife The stomach was tightly adherent to the mass which was removed with the pancreas colon and kidney The gastric mucosa appeared perfectly normal There was only a small amount of fluid and mucus in the stomach but the ileum and colon were filled with discolored blood

This description of the tumor mass is taken from the necropsy protocol The tumor mass occupies the normal position of the tail of the pancreas It measures 9 centimeters in diameter It is spherical in outline with fairly smooth walls and is bound to the greater curvature of the stomach by dense adhesions The splenic flexure of the colon is bound to the tumor in a similar manner The pancreas is so intimately connected with the tumor that it is impossible to separate it indeed it has the appearance of having arisen in the pancreas The tumor extends to the hilum of the spleen and there are a few fibrous adhesions binding it to this organ It is anterior to the kidney and adrenal and is bound to these organs by dense connective tissue adhesions On section about 100 cubic centimeters of thick cloudy fluid greyish red in color escapes from the tumor The tumor cuts with difficulty On section there is a dense connective tissue wall which will average 5 centimeters in thickness It is lined by a reddish soft material In the center of the tumor is a mass about 5 centimeters in diameter which is firmly attached to the wall on one side The mass is covered by lamellæ of gelatinous material alternating with material of the same consistency but colored with blood The central portion shows a considerable quantity of an opaque white pithy like substance which infiltrate the gelatinous tissue

The capsule of the left kidney stripped with difficulty leaving a smooth pale surface Otherwise both kidney were negative There were a few small fibroid nodules on the uterus

Further dissection of the tumor mass in the laboratory showed the splenic artery entering its medial side and leaving the lateral side of the cavity containing the lamellated mass Small but dilated veins leaving the hilum of the spleen were lost in the dense connective tissue of the tumor The renal artery and veins were also bound up definitely in the tumor mass Much connective tissue had invaded the upper part of the pancreas displacing much of the normal tissue of this organ

Microscopic sections showed a slight amount of bronchopneumonia and chronic passive congestion of the spleen The pancreas sections showed a marked amount of connective tissue and some dilated veins especially in parts near the tumor wall



Fig Showing aneurism Specimen was cut transversely with resection of the kidney and opened to show interior of the sac *A* Middle and *B* lateral end of pancreatic tail *C* pedicle of spleen *D* kidney

Various sections of the tumor wall showed dense fibrous connective tissue bands many areas of round cell infiltration but no definite artery wall Weigert's elastic tissue stain of the tumor wall showed no elastic tissue except in the wall of small arteries found in the connective tissue mass Diagnosis Aneurism splenic artery compression splenic vessels with chronic passive congestion of the spleen varices of the vasa brevia of the stomach hæmorrhage in the stomach and intestines bronchopneumonia

This patient then had a history of indigestion all her life some dyspepsia and three attacks of severe loss of blood in the last year of her life This was suggestive of a gastric ulcer but the X ray examination was not satisfactory although it did show a large spleen and apparently a large liver No other X ray examinations were obtained as the patient would not return except when almost in extremis Even when in the hospital she would not permit careful examination and refused to cooperate in any way Operation was considered but not deemed advisable at her last entrance Transfusions helped to a certain extent but apparently the continual blood loss was too great It seemed rather hard to explain such severe *gastro intestinal* hæmorrhages when there was no ulceration However the markedly dilated vasa brevia showed that there must have been marked compression of these vessels Banti's disease was thought of and for this operation should have been done However autopsy showed

that this would have been useless as neither the spleen nor the aneurism could have been removed successfully

Crisp (1847) in a treatise on blood vessels has given a table of 531 aneurisms collected from the British literature from 1785 to 1847 in which only one splenic aneurism is given *This was said to have appeared in the Dublin Journal volume xxvi* and has been included in the table of cases compiled here

Barlow (1898) in describing a case stated that he had found reference to 39 abdominal artery aneurisms of which 10 were of the superior mesenteric and splenic artery and 9 of the hepatic artery Reynold (1906) and Rolleston (1898) mentioned that in Allbutts *System of Medicine* reference is made to 20 cases of splenic aneurism Wooley (1917) found no record of splenic aneurisms in 530 autopsies Garland (1921) in 4 100 autopsies at the *Massachusetts General Hospital found* only 3 cases of splenic aneurism but described only one of these *He found reference to 14* in the literature Harnett (1922) stated that there were 60 cases in the literature published before 1906 but gave no references

We have found references to 43 cases if we include Crisps case in 1847 The next case tabulated here was described by Monfick in 1873 Jannins case (1880) *which has been* quoted by several authors was described as an unusual aneurism but the author himself stated later that he at first wrongly thought it to be of the splenic artery for this reason it has not been included in the table In 1908 Walz described a case under the title of embolic aneurism of splenic artery which we have not included because no proof is given *Following a chill and fever an enlarged spleen* was found and endocarditis diagnosed Splenic infarcts were thought to have developed The patient died but no autopsy was obtained

Reference has also been made in the literature by Smith (1911) to a case which possibly should have been included This case was a female 35 years old who was about to be delivered After lifting a heavy weight she had a severe *pain in the abdomen and died the* next morning Autopsy revealed a full term male fetus in an uninjured uterus with an intramural fibroid There was much blood in the left hypochondrium and a tear in a branch of the splenic artery at the hilum but no aneurismal sac was found The spleen was normal There was an endocarditis involving the mitral valve We have not tabulated this case because of the normal spleen findings and because no aneurismal sac was found The case is however quite similar to Wesenberg (1911) and is quoted by him

We have then tabulated 40 cases (Table I) giving some of the salient facts such as cause *location of aneurism size etc That 40 cases* only have been published in the last 50 years is evidence that the condition is rare In the absence of any detailed compilation of these cases our table and review may not be amiss

In analyzing the table it is seen that these 40 cases are about evenly divided between the sexes 19 males 16 females while in 5 the sex is not stated Thirty-one range from 0 to 60 *years of age there being 9 in the fourth decade* and 8 each in the third and fifth In 6 the age is not stated Many different diagnoses have been made on the cases However 6 of them had endocarditis 13 had a splenic tumor 3 of these also an epigastric tumor and 1 had only an epigastric tumor One was a full term pregnancy 1 was thought to be a ruptured ectopic pregnancy 4 were considered as *gastric ulcer while in 14 cases no clinical* diagnosis was given Only 1 was diagnosed as splenic aneurism In 5 of the endocarditis cases embolism was definitely given as the cause of the aneurism In 4 there was a history of injury 1 abdominal 3 years before 1 in childhood 11 years before and 1 from a bullet wound about 3 months previously In 25 no cause was given In 6 it was *definitely stated that either* there was a negative Wassermann or that there was no luetic history while in only one was it stated that the patient had lues in youth

In 12 of the cases there was hemorrhage into the gastro intestinal tract in 1 case erosion of the aneurism by a supposed gastric cancer in others rupturing of the aneurism into the stomach and in into the colon In 17 cases it is *either not clear* where the hemorrhage was or it was not made clear whether there was a hæmorrhage In 1 case it is definite that there was no hæmorrhage and in 1 the

hæmorrhage was intraperitoneal in 1 of which there was also gastric hæmorrhage

In 33 of the 40 cases the aneurism was found to be of the main trunk of the splenic artery Twenty five of these had single aneurismal sacs and 8 had two or more sacs Of the 33 cases in 16 the aneurism had ruptured 4 times into the gastro intestinal tract 11 times into the peritoneum and once into the vein In 1 of these cases described by Osler (1889) there were multiple aneurisms 1 on the main splenic others on its branches In 7 of the 40 cases the aneurism was found on a branch of the splenic artery Five of the 7 branch aneurisms were single sacs and 3 of the 7 ruptured once each into the stomach peritoneum and vein

It is very difficult to estimate how long the patients may have had splenic aneurisms Symptoms which may be considered as suggestive have lasted from one day to fourteen years In 24 cases no statement is made as to the length of time the patient had any illness Our case here had had severe pain at times and 3 severe hæmorrhages in the last year of her life

Definite data were not always given as to the size of the aneurismal sacs In 8 cases it was no larger than a cherry in 15 it was as large or larger than a hen's egg In our case it measured 9 centimeters in diameter which is larger than any we have found recorded Seven were intermediate in size while in 10 cases the size was not stated Data about the spleen were incomplete or indefinite in 17 cases In 22 it was stated that the spleen was enlarged some twice the normal size others very markedly enlarged Eight of these had both an enlargement of and infarcts in the spleen while in 3 only infarcts are mentioned

In 33 cases the aneurism was found at autopsy one rupturing during labor after which a dead fetus was born the patient dying several hours later One was diagnosed during life and found at autopsy Six patients came to operation and 4 of the se recovered There was 1 operative death and 1 18 days later following infection and hæmorrhage It is to be noted that operations have been done only in recent years

DISCUSSION

Splenic aneurism then has not been frequently found In the 40 cases here collected we can say little as to the etiology The cases were quite evenly distributed between the sexes which is in marked contrast to the accepted figures of 5 in the male to 1 in the female (Crisp 1847 Osler 1908) for all aneurisms The majority of cases have been described as occurring in adult life between the ages of 20 and 60 Endocarditis has been the most frequent diagnosis In 5 of the 6 so diagnosed an embolism apparently considered as coming from the valvular vegetations was found in the aneurismal sac Ponfick (1873) believed that this was frequently the cause and stated the three conditions necessary for producing aneurism (1) embolism at the (2) branching of a vessel which lies in (3) loose supporting tissue His two splenic aneurisms were described in branches of the splenic artery near the hilus and both patients had an acute endocarditis Weinberger (1907) agreed with Ponfick's conclusions Although his patient had acute endocarditis Selter (1893) believed that an increased blood pressure following embolism was essential In fact in several of the cases arteriosclerosis was the clinical diagnosis and Selter contended that Ponfick could not rule out increased pressure in all of his cases Kolleston (1898) would add to an increased pressure a weakened vessel wall although he gave no cause for the latter Thorel (1910) stressed the presence of acute endocarditis and a resulting infection about the embolism as a cause of aneurism It may be admitted as Ponfick stated that a calcified excrescence may sufficiently injure the endothelial lining so that an aneurism (false) may develop It may be also that an infection plays a part Since 33 of these 40 cases occurred in the splenic artery one of Ponfick's conditions—that it occurs at the branching of a vessel—is thrown out Lither Ponfick's theory is not correct or this condition must be considered a very minor factor in his theory of cause of splenic aneurisms Binder (1913) stated that syphilis is not a cause except in aortic aneurisms In 6 of the case reports it is mentioned particularly that there were negative luetic history findings or Wasser

mann. Unfortunately we have no record of a Wiedemann aneurism but both the patient husband and son had negative reactions. Mulley (1915) thought that in his case an automobile accident 10 years before was a factor.

Infection has been admitted as a cause in aneurism of other vessels particularly of the aorta. Tarozzi (1901) described a true aneurism of the splenic artery and thought localized collection of elastic tissue with intervening areas without this tissue might be a cause of the aneurism. Several authors here quoted noted the lack of elastic membrane in the aneurismal wall as is true in our own case but we would hesitate to accept this explanation with no more proof than there appears to be.

It is a surprise to us that in only 4 cases is there a history of trauma. Since trauma in one of these occurred about 50 years before an enlarged spleen and epigastric tumor were found this could be ruled out as an etiological factor. In another case a bullet wound (Marshall 1913) several months before and in a third an abdominal injury (Harnett 1922) 3 years before followed shortly by symptoms may be accepted as direct cause. Monro (1906) had a history of a fall twelve years before dealth with fracture of skull and leg. From the fact that this condition occurs about equally in the two sexes we have indirect evidence that trauma is only occasionally the cause.

In etiology then splenic artery aneurisms differ from others in that the sexes are about equally affected. Twenty five of the 40 patients being under 50 years of age brings many below the age of arteriosclerosis. Lues appears to be ruled out in a few cases. Infection with embolism traced by some authors with localized infection emphasized by others was demonstrated only in about one eighth of the series. Trauma at least severe injury also is very rare. Apparently then we can not give any definite determining causes can be done in the case of arterial aneurisms.

As to the symptomatology half of the cases (13) had either gastrointestinal or intraperitoneal hemorrhages. The gastrointestinal hemorrhages may last many months as in the case described by Hoegler (1910) and in our own or it may terminate fatally at once following rupture into the gastrointestinal tract (5 cases). When lasting many months there may be a severe anemia as was noted in our case. Hoegler believed the hemorrhages in his case due to the adenocarcinoma of the pancreas which was found at autopsy. We are inclined to doubt this since so many of the cases (13) of splenic aneurism have had gastrointestinal hemorrhages and such hemorrhages are not described in carcinoma of the pancreas. But we do believe that the marked cachexia of Hoegler's case may have been due to the cancer of pancreas. It is worth pointing out however that a marked pancreatitis has been observed with splenic aneurism (Ahrens 1889 authors case) and a chronic fibrous condition may be grossly not unlike cancer.

Billeman in an article on aneurism and varices causing gastric hemorrhage gives some statistics of abdominal artery aneurisms. He quoted Mueller who in 10,360 autopsies at the Jena Pathologic Institute from 1865 to 1900 found 159 aneurisms of which 69 were cystic. Nine aneurisms of the splenic artery were found. No other details of these were given nor was there any reference to Mueller's original report.

Intraperitoneal hemorrhages due to rupture were fatal in all cases (12) where it was found. One case occurred after removal of abdominal fluid. Another one treated with the same procedure terminated quickly with severe gastrointestinal hemorrhages. An arteriovenous connection was found at autopsy by Goodhart.

An epigastric tumor with a murmur has been noted in all but one by Hoegler (1910) who diagnosed his case before death. Ahrens (1889) noted a murmur over an epigastric tumor and Goodhart (1880) a venous bruit over the spleen.

Since in many of the cases the aneurism was described as *the size of an egg or larger* one would think that an epigastric tumor would be found rather frequently. However that this is not the case is shown by the fact that in only 4 was such a tumor described. In our case in which there was probably the largest

aneurismal sac (9 centimeters in diameter) no epigastric mass was noted Hoegler mentioned that Falta in discussing his case believed that the epigastric tumor with murmurs should suggest aneurism of the cœliac or neighboring arteries In our case the wall measured 1 centimeter or more and was composed of dense fibrous tissue Autopsy records show an enlarged spleen in 19 cases although this is mentioned only 13 times in the physical examination It was suspected in the X ray examination of our case but never definitely made out

Pain has been noted sometimes it takes the form of very severe abdominal cramps sometimes of only discomfort in the epigastrium In 4 cases there was epigastric pain in 2 pain over the splenic region and in 8 general abdominal discomfort or pain These do not include cases with endocarditis or those with severe pain a short time before fatal termination following rupture of the aneurismal sac either into the gastro intestinal tract or peritoneal sac Villard and Murard (191) thought as did Reynolds (1906) that acute severe epigastric pain with no other symptoms may indicate an aneurism Hoegler s case had particularly severe pain when straining as in coughing or defecation Of course in the cases that ruptured acute severe pain and symptoms of shock were noted The X ray should be of assistance in ruling out gastric tumors or ulcers

There are several rather definite points to be made out in diagnosing this condition A history of epigastric or upper abdominal pain more or less gastro intestinal hæmorrhage an enlarged spleen an epigastric tumor with a murmur and anæmia should certainly point to a plenic aneurism but none of these findings would rule out a cœliac aneurism The large spleen and the X ray should help rule out gastric ulcer The spleen is however not large enough and the leucopænia would tend to rule out Banti s disease Banti s disease was suspected by one of the authors (Treve 1903) and suggested in our case Other splenomegalic cases have various findings familial history large liver icterus etc which should not occur with splenic aneurisms

Ponfick (1873) and others believed these were not true aneurisms but were of the pseudo aneurism type Ponfick s views on etiology confined them to this type In our case it was impossible to determine the type Sections of various places through the sac wall showed only dense fibrous tissue No evidence of elastic tissue or any elastic membrane was found Several authors mentioned that no elastic tissue was found in the aneurisms of their cases In our case there were marked dense adhesions between the spleen kidney stomach and colon also made up of fibrous tissue Heppner (1874) described calcification of the median liver which is similar to that found in other aneurisms such as the aortic Tarozzi (1903) described a case as a true aneurism and ascribed it to lack of elastic tissue in part of the vessel wall Cylindrical aneurisms have been described by Beaussenot (1892) and Wesenberg (191) Most of them however have been described as saccular enlargements Our case belonged to this type Atheromatous aortas and occasionally marked atheroma of the splenic artery with marked tortuosity and increased length have also been described (Heppner 1874 Binder 191 etc)

As to the location of the aneurisms we found in this series 3 are of the splenic and 7 of its branches with one multiple aneurism of both Hoegler stated in his series *that more* occurred in the branches than in the main splenic artery

The prognosis would seem to be bad judging from our figures *here where only* 4 of the 40 recovered When we remember though that only 6 were operated upon and 4 of these recovered the *prognosis is much* better with operation In 1 case (Smith 1923) the aneurism had ruptured and with a diagnosis of *ectopic pregnancy* operation was performed A sac was found at operation but after *finding no bleeding* aneurism was given up as a diagnosis and the sac thought to be a pancreatic cyst *This* was packed but the patient died within hours Postmortem examination showed an aneurism on the splenic artery *In another* case difficulty was encountered in arresting hæmorrhage and removing a mass Eighteen days later the patient died from hæmorrhage In our case

TABLE I—CASES OF FEMALE WITH ANEURISM

J	00	M	5			Fusiform	Internal carotid		Hemiparesis	Late	Angiography	Successful clipping of aneurysm
T	00	F			None		Internal carotid		Weakness		Angiography	
Walsh		M		Stroke			Internal carotid	6 years		Late	Operation: Stroke during surgery	Recovered
Reynold	6	F			None	Fusiform	Internal carotid	Years	Seizure	Late	Angiography	
Rayl (Obit)		M		Coma		Multiple	Internal carotid				Angiography	
Mc	6	M		Epidural hematoma	Fall from bicycle		Supraclinoid internal carotid		Transient hemiparesis	Late	Angiography	
Watt	00	M		Epidural hematoma; subdural hygroma	Embolism	Fusiform	Internal carotid	3 years		Late	Angiography	
Thomas	9					Fusiform	Internal carotid		Hemiparesis; aphasia	Late	Angiography	
Taylor Thomas		F	3	Gunshot wound	Thrombosis		Internal carotid			Late	Angiography	
Weiland Mead		M	3	Epilepsy; mental retardation		Saccular	Internal carotid	3 years	Seizure		Operation: Stroke during surgery	Left hemiparesis; persistent seizures; mental retardation
Wang	9	F	3	Mental retardation; hydrocephalus		Fusiform	Internal carotid; posterior communicating artery		Mass	Late	Angiography	Incidental finding; hydrocephalus
Bird	9 3	M	7	Headache; mental retardation?	Neurofibromatosis	Fusiform	Internal carotid; posterior communicating artery	7 years	Weakness	Late	Angiography	
Wiley	7			Asymptomatic			Internal carotid		Choreoathetosis		Angiography	
Melby	8	F	8	Seizure disorder; mental retardation; facial asymmetry			Internal carotid		Apparent cerebral infarction	Late	Operation: Stroke during surgery	Recovered without deficit
Hoegh		F	6	Epidermoid cyst; facial paralysis	Neurofibromatosis	Fusiform	Internal carotid	Years	Hemiparesis	Late	Angiography	Carotid patency documented
Gould		M	5	Asymptomatic		Fusiform	Internal carotid; posterior communicating artery		6th nerve palsy		Angiography	Recanalization
Hall	9	M	35	Left lateral ventricular hemorrhage	Abdominal injury; bowel perforation		Internal carotid	6 months	Transient hemiparesis	Late	Operation: Stroke during surgery	Recovered without deficit
Marshall	9	F	7		Bullet wound; thrombosis of internal carotid artery	Fusiform	Internal carotid	3 months	Ruptured aneurysm; subarachnoid hemorrhage		Operation: Stroke during surgery	Recovered without deficit
Smith	9 3	F	38	Headache; mental retardation; epilepsy		Fusiform	Internal carotid; posterior communicating artery	8 days	Hemiparesis; aphasia	Late	Operation: Stroke during surgery	Persistent hemiparesis
Ahrens	3	F	8	Gunshot wound	Neurofibromatosis	Cystic	Internal carotid	9 months	Hemiparesis	Late	Angiography	Partial thrombosis of aneurysm

the adhesions of the *spleen to surrounding* organs would have made extirpation very difficult if not impossible The large aneurismal sac was so closely bound to pancreas and posterior abdominal wall that ligation would have been impossible However in some of the cases extirpation of tumor and spleen were said to have been comparatively simple

As to treatment there can be no question in the authors minds that laparotomy should be done As Winkler (1905) stated aneurisms of the splenic artery with enlargement of the spleen belong to the operable splenic tumors Operation should be done early As shown by Smiths case after rupture there is little time *Our* case *shows* that adhesions develop so that operation may be practically impossible

SUMMARY

From a study of 40 cases of splenic artery aneurism collected from the literature from 1864 to 1923 it has been found that 6 patients were operated upon and 4 of these recovered The first one operated upon was reported by Winkler in 1905 with recovery Four of the cases in which operation was performed have been reported since 1918 In all of the cases except 1 diagnosis was made either at operation or autopsy In this one case (Hoegler 1920) there was what we may consider a fairly typical course of abdominal pain gastrointestinal hemorrhage splenic tumor pulsating tumor of the epigastrium with murmur and X ray study ruling out tumor of the stomach At autopsy however a carcinoma of the pancreas was found as well as a small aneurism of the splenic artery

Thirty three of the cases were diagnosed at autopsy In most of these death was directly due to the aneurism Many had had symptoms of abdominal pain or distress enlarged spleen and gastrointestinal hemorrhage a few had epigastric tumor with murmur In most of them the diagnosis was undetermined which is shown also by the variety of diagnoses made It is evident as Schroetter suggested that most cases are undiagnosed

CONCLUSION

With the symptoms of abdominal pain gastrointestinal hemorrhages splenic and epigastric tumors and X ray studies ruling out tumor of the stomach aneurism of the splenic artery should be considered and operation advised for an operation lies the only hope of recovery in these cases

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LEUCOPLAKIA OF THE KIDNEY PELVIS

With Report of Two Cases

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LEUCOPLAKIA has long been a subject of interest and conjecture because of its unknown etiology and pathological significance. The occurrence of such a process in the urinary tract represents [illegible] by the [illegible] and gross appearance of skin together with its relative rarity render of importance the further accumulation of detailed evidence in the hope of throwing new light on such a problem. The urinary tract is embryologically derived from an entodermal and [illegible] in which leucoplakia [illegible] (ect [illegible]). Our interest in this condition was first stimulated by the occurrence of a few cases of squamous cell carcinoma of the bladder. The conclusion was reached that leucoplakia played a very definite rôle in the development of squamous cell carcinomata of the urinary tract (15). The more recent occurrence of two cases of leucoplakia of the kidney pelvis has prompted us to make a thorough survey of the literature. The literature is chiefly European, especially German. We have found but four American observers who have published similar reports (Beer, Cumming, Rubin, and Kretschmer), the first one being in 1914 (Beer). Kretschmer was able to collect 11 cases of leucoplakia of the ureter and bladder (19). In 14 of the cases included in our analysis there was leucoplakia of the kidney pelvis. We have been able to collect 41 cases of leucoplakia of the kidney pelvis. The report of 2 personal cases herein brings the total number of cases to 43. The rarity of leucoplakia in the urinary tract is probably more apparent than real, and with a more general knowledge of the condition will undoubtedly be more often recognized. The first

mention of leucoplakia in the urinary tract was made by [illegible] in [illegible]. [illegible] reported a case of leucoplakia of the bladder. [illegible] was apparently the first [illegible] the condition in the kidney pelvis.

[illegible]

The present [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]



Fig. (lh t aph f kid v c t gittally h i g th kl f k n luk l n g f the p l (leu plak) The pr c s te l t th em test aly es f l n th ur t a f ras t goes Th ppa t marg f the le plaki at th ter j l ic j nct n pr b l ly pre e t up f i l ul r t n d lesq mat n f th le opl k c p oces N t th tl k f th all f the p l y d u eter n j th m ll cy t t t l f t th m l fl f th p l i

ors cloudy st a y color d alkalin albumin heavy tra ugar non m cop examin tion h e l numerous white blood c lls occasional epithel al cell numerous rods no red blood cells c st etc Ichthalein was given intramuscularly In th first h ur 35 per nt was r turned in the s con d h ur 12 p r c nt m king a total of 47 per cent eturn Blood Wa ermann 2+ ith 2 ant gen

Cyst c pt n fl Urine from the right kidney hov ed numerous r d blood cell an occa nal hite blood cell no epithelium no casts and no rgani ms Cultur s r turned bacillus proteus The left kidney urine h w d n mer us red blood cells ro nd blood cell no pithelium no ca ts n org ni ms and ltur s w re steril Th bladd r urin sho ed r d blood cell no c sional hite blood cell n epithelium n ast an d no organ ms Cultures sh w d bacillu prot us Ichthalein given intra ul appe d in 20 minute f m th right k dn y an 5 min tes f om th left In th first 15 minut s n n j d from th right k dn y but 3 p r nt fr m th l ft In th nd 15 minut s th r wa 1 per c nt f om th right k dne an d 18 pe nt f m the l ft mak ng t t l of 1 per cent fr m th right kidn y and 31 p r c nt fr m the l ft Th wa n l k g

Th bladd r fl w s rk fl h gg gr nul r n l m bra y fl m d l a ugg tiv of an ru te l t t Th right ur t r l r nc w t ly d l the l ft ur t r l r l appe d to l e

y w m ammat m formed d r e en y d l w m f ed f

in a small excavation There was some difficulty in putting the catheter up to the right kidney The left ureter was easily catheterized

Pyelographic studies of the right kidney showed a hydronephrosis and several strictures of the right ureter (Fig 3)

Diagnosis There were strictures of the right ureter with an infected hydronephrosis and hydroureter and severe encrusted cystitis

Operation Right nephrectomy was done under nitrous oxide and oxygen anæsthesia The kidney was very difficult to free because of the former operation and inflammatory changes

Course The convalescence was uneventful and the patient left the hospital on the twenty sixth day after operation

Cystoscopy was performed about 2 weeks after operation The bladder wall was seen to be covered especially on the left side with a rough shaggy white membranous covering Because of the marked infection still present greater detail could not be made out Leucoplakia of the bladder associated with that of the kidney pelvis was suspected After several weeks of rigid treatment the cystoscopic examination was repeated The urinary infection had been markedly reduced and the bladder wall was more clearly defined The white membranous appearance was the same as that seen previously Over the trigone and in the region of the left ureteral orifice the membrane had a sort of dull wrinkled appearance The left ureter was seen in an excavation the depth of which was roughly the thickness of

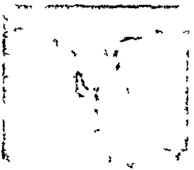


Fig. ... The ... with ...

... the ... It ... Of ... Although ... both ...

nary lel ... has been almost e t ly overcome the ... ture has remained ... its

Gross pathology. The gross ... of a ... dilated ... somewhat ... than normal, measuring about 6 centimeters in length. The ... were ... Toward the upper pole of the kidney there is a small ... communicating with a ... there ... at ... during operation. The ... the ... very ... and ... be ... The section ... picture ... with ... replacement of ... parenchyma. However ... all ... remains ... markings. The pelvis ... the ... and ... normal ... appearance. The pelvis ... present a remarkable picture ... The mucosa ... like ... Near the ... pelvis ... which when ... traced ... The proximal ureter ... The ... of the calyces in the same process ... the ... short ... ureter ... and the proximal ureter ... present ... like a ulcer.

... pathology. Microscopic examination ... most ... the ...

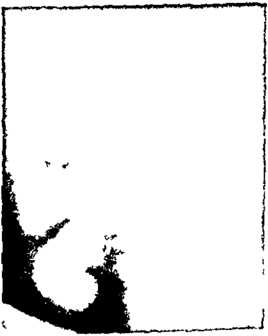


Fig. 3.



Fig. 4.

... Case ... Right ... before operation ... ureteral ... marked ... by ... the ureter.

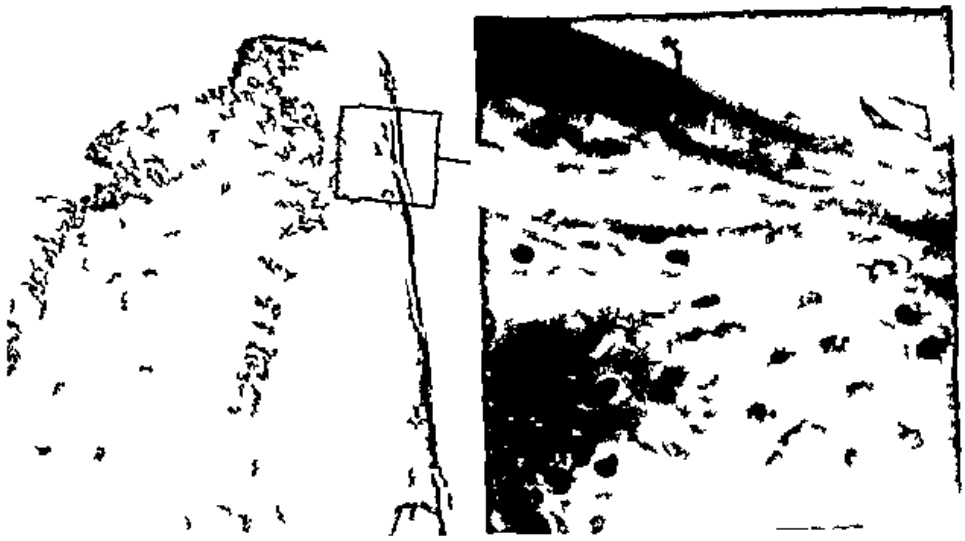


Fig 4 C Phot m c og r phs (low nd i gh po r) h w ng leuc plakia of the bl dd r Th sp c me wa tak n with the cy t op r geur and illustrates the al e f r m al of tis ue for h t l gical e mi ti n thr gh the cy toscope n doubtf l ca s Note the upe fc l d squamat g l yer of ker t a d be e th th s th gran l um c ll imp g ated ith basop hil c kerat hy lin granules

of the parenchyma shows the normal kidney structures to be present but they present pathological changes There is a considerable tubular dilatation most marked in the distal convoluted tubules but present to some extent in the collecting tubules as well The Bowman s spaces are also moderately dilated and the glomeruli show degeneration varying from normal to complete fibrosis and hyalinization The tubules throughout great areas are distended with hyaline moderately eosinophilic material The epithelium of the tubules shows more or less degeneration varying from cloudy swelling to vacuolization The capsule is quite thinned and adherent with considerable hæmorrhagic extravasation The blood vessels are very much thickened Large areas of complete replacement of parenchyma by lymphocytic infiltration and fibrous tissue are seen

Microscopic examination of tissue including the pelvic mucosa shows marked inflammatory reaction chiefly lymphocytes most marked in the submucosa verging in areas on abscess formation The mucosa itself presents a remarkable change into squamous epithelium duplicating the structure of the skin almost exactly A stratum corneum is present and beneath this a highly pigmented granulosum of cells filled with keratohyaline granules and beneath this squamous epithelium merging gradually into a basal layer of cells which shows in areas papillary ingrowths resembling papillæ of the skin This papillary ingrowth is most marked in areas where the involvement is most intense In one area it has almost the appearance of carcinoma and must be regarded as definitely precancerous The skin like mucosa therefore must be considered as well differentiated leucoplakia (Figs 5 to 12) It is this condition which probably in most instances gives rise to the relatively rare squamous carcinoma of the urinary tract

Sections from remote calyces show as does also the ulcerated area in the ureter thick vascular granulation tissue with epithelium for the most part entirely denuded

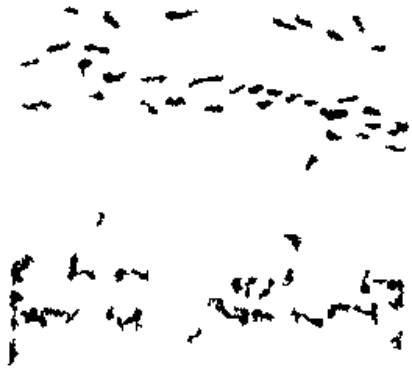
Diagnosis Chronic infected hydronephrosis and hydroureter with pelvic leucoplakia definitely precancerous in character

CASE 2 A woman age 34 years married entered the Urological Service of the University of California Hospital complaining of (1) pain in the right loin and (2) frequency of urination The family history was essentially negative The past history showed that she was born in Italy where she had lived up to the age of 23 years Since then the patient had resided in California As a child she had the usual diseases and influenza at 30 years At the age of 22 she had a neisserian infection was treated by a doctor and pronounced cured Lues were denied At the age of 26 years there was some loss of hair which was restored by several injections of salvarsan There was no history of previous operations Habits were good

The patient thinks that the present illness began 12 years ago when she contracted a neisserian infection For 2 years following she was troubled with lower abdominal pain in the left side There was no history of urinary disturbance at that time About 9 years ago there began a feeling of suprapubic distress with a rather sharp pain in the right loin which tended to radiate into the bladder and urethra This persisted and became gradually worse Urinary distress gradually appeared with some nocturia frequency *and tenesmus In the last 6* months her condition has rapidly become worse until now there is nocturia from 6 to 8 times urgency and frequency from 8 to 10 times daily There is difficulty in beginning urination which is accompanied by severe burning both before and after urination The urine has become very turbid and cloudy There have









F 8 Fg 9 Fig 10

Fg 8 Ca Ph t mi graph (l po) f rea f leu opl ki re l p l i In th s a e th sup fcial l ye f k atin h desquamated lea g the st tum gr ulo m pp m t Not th rema kabl cell lar ncl i n whi h res mbles l ly a b ceo s gla d

Fg 9 C se i Ph t mi graph (l pow) f rea f l u pl k a i re l pel Note th m rked lymphocytic re ti n and the i egular defi tely p a er us p p llary infiltrati n i the ubmuc a

Fg o Ph tomic ograph (l w pow) f n mal sk n f muc s m mb ne of l p f r c mp rison vith le c plaki of th en l pel i Th a o s layer of the skin appe qu te f thf lly rep od ed n leucoplaki of the urinary tra t

ing about centimeters belov the u eteropelvic junction A longitudinal pyelotomy incision was made above and including this point and a probe passed do vn beyond thi point of narrowing The ureter and pelv s above this point were seen to be filled with a whitish s aly drv grumous mater al resembling leucoplakia or cholesteatoma This vas cur tted from the mucous membrane A No i F oft rubber catheter v as perforated and passed down the ureter past the poi t of narrowing A hole was punched th ough the upper calyx opening on the kidney surface and the tube brought out through this opening fo drainage The pyelotomy incision wa closed with No oo plain catgut the lower part be ng closed as in the Mikulicz ope ation A nephropexy vas performed and the wound closed in the usual manner

C u se Con alescence as fairly uneventful

Cy l c p evam natio i 4 u ks after op at on Ur ne f om the r ght kidney sho e l 4 to 5 red blood cells to a high diameter f eld numerous white blood cells numerous epithelial cells no casts and motile rods Cultur s gave bacillus oli Urine from the left kidney showed o to 12 red blood cell to a high po er held 4 to 5 v hite blood cell 2 to 3 epithelial cells no a ts and motile rod Culture gave b c llus coli Bl lder ur ne showed 3 to 4 red bloo l c ll to a h gh diameter field numerous hite blood c lls 4 to 5 pithel al cells no casts and motile rod Cultures g ve bacillus coli Phthalein gi en int a venously appeare l in 10 minute from the right kid ney and in 5 minut s from the left In the first 15 minutes th re v as a tr ce from the right kidney and 12 l er cent from the left In the second 15 minut s there v as a trace from the ight kidney and 3 per cent from the left making a total of 15 p cent from the left kidney v ith a trace from the right There was no leakage

The bladder wall was not clear since the p tient had just had a mercurochrome instillation A cath eter size No 6 F on the right passed up without difficulty

Since operation (16 months) numerous lavages of both kidney pelves have been given with i per cent silver nitrate The infe tion in the left kidney has entirely leared up The right kidney while some what better than before operation has failed to make much improvement there beirg a marked pyuria from it and de reased function The bladder has improved except for a small ulceration anteriorly just behind the vesical neck

Cystoscopic examii atio i 16 months afte operation Urine from the right kidney sho ved no red blood cells 50 to 75 vhite blood cel to a high diameter field no epithelial cells no casts and an occasional motile rod Cultures gave bacillus coli Urine from the left kidn y shov ed no red blood cells no white blood cell no epithelial cell no casts and no organisms Cultures were sterile Bladder urine showed no red blood cell 50 to 75 v hite blood cells to a high diameter f el l no epithelial cells no ca ts motile rods Cultures gave bacillus coli Phthalein gi n ntravenously appeared in 5 minut s from the right kidney and in 3 f om the left In the first 15 minutes 3 per cent appeared from the right kidn y and 9 per cent from the left In the second 15 min utes 1 per cent appeared from the right kidney and 7 per cent from the left There was no leakage

Pyelographic studies sho v that the hydro nephrosis on the right side (operated upon) has been

but which possess embryonic potentialities and (c) cells which are only partly differentiated and hence changes in reactivity. He points out that newly developed epithelial cells are not as highly specialized as the preexisting cells and that the change may occur only in the presence of certain abnormal conditions. Haythorn's partial denial to the implantation theory that the epithelium including the basement membrane is destroyed by the abnormal stimuli the new cells resting on the basal layer of granulation tissue and that the resultant change supports in a measure Schindler's views so far as they show that the metaplastic cells are newly formed cells and that they come from the growing layer. This supports Ribbert's view too in that the newly formed cells are less highly specialized than the normal cells and also that the surrounding influences have a strong influence on the type of new cells formed.

Haythorn thus opposes the theories of embryonic cell rest in this particular instance at least and concludes that the mucosa destroyed by the horse of course tries to protect itself with the best reparative cells it can produce. Interestingly enough he points further out that there is probably a link between the injury to the basement membrane and tumor growth that is that the irritants and inflammation which destroy them open the way for metaplasia and new growth.

The term metaplasia has been carelessly used in the past beginning with Virchow himself to explain a variety of conditions. But in the light of our present knowledge of metaplasia which has been more accurately defined by Orth as the transformation of a well characterized tissue into another equally well characterized but morphologically and functionally different the term is applicable only in the sense stipulated by Haythorn in which embryonically misplaced cells can be ruled out.

The exclusion of embryonic cell rests is not so easy as might at first appear. Stachlin R. Meyer Guinard and others have stated that the pronephric portion of the wolffian duct is of ectodermal origin and that abundant opportunity is afforded in the complicated embryogeny of the urinary system for the misplacement of cells from the primitive ectodermal plate and the growth of these aberrant cell rests subsequently to various parts of the genitourinary tract. This possibility has furnished a plausible alternative explanation of leucoplakia but also of dermoids of the prostatic cord (?).

Granting then the metaplastic nature of leucoplakia in the strict sense of the term I have considered various physiological and clinical effects that have been alleged to explain the process. In a previous publication we (Hinman and Gibson) offered the suggestion that leucoplakia was a process of protective compensation that epithelium in general possessed a dual potentiality namely (1) differentiating and exercising a normal function according to location but also (2) a kind of protective mechanism into play in a uniform way under certain conditions of irritation. For example it was felt that just as a human being dons gaiters and furs to adapt the underexposed part to a rigorous climate so the mucous epithelium changes under certain harassing influences donning a resistant skin like coat of cornified squamous epithelium. Such a process suggests the Lamarckian factor of adaptation to environment as the result of a long continued inflammatory process.

Unfortunately the metaplastic changes of epithelium to leucoplakia as experience has shown cannot be considered physiological but are definitely pathological the condition by its presence alone apparently maintaining an incurable state of chronic inflammation and irritation. It does not spontaneously regress with the subsidence of the primary source of irritation (commonly calculus or infection of long duration) but in time tends to undergo malignant degeneration just as does leucoplakia buccalis. Veit states that leucoplakia of the tongue is definitely precancerous and is but a step in the evolution of squamous cell carcinoma. He states that 9 per cent of such cases become malignant. Kretschmer refers to leucoplakia tone and infection as the almost universally recognized forerunners of non papillary carcinoma of the renal pelvis.

In an exhaustive review of the literature of squamous cell carcinoma of the bladder we

(Hinman and Gibson) were forced to the conclusion that malignancy of this type was definitely on a leucoplakic basis in a great many cases

In the causation of leucoplakia the vast majority of authors emphasize the coincidence of obstruction calculus formation or long standing infection Ziegler states that epithelial metaplasia occurs most frequently in chronic inflamed mucous membranes Exceptions are seen in such rare cases as those of Lecene who believes the condition to be congenital heterotopia and of Posadas who believes the origin of the condition may be traced back to syphilis However it seems that syphilis in the mouth as well as the urinary tract is present in only a small proportion of cases and even in these its rôle is doubtful In the last analysis the etiology is still obscure and the importance of calculus inflammation and obstruction as contributory factors is still *sub judice* Braasch states that in autopsy material he has seen leucoplakic and pre leucoplakic changes in pelves without evidence of obstruction or mechanical irritation [1] On the other hand leucoplakia is relatively infrequent as compared with various other pathological conditions in the urinary tract The occurrence of leucoplakia in small patches when the whole mucosa is equally irritated the occurrence under apparently similar conditions of rare cases of pyelitis cystica without leucoplakic formation are points requiring explanation before the etiology of leucoplakia is revealed

CLINICAL CHARACTERISTICS

There is nothing characteristic in the diagnosis of leucoplakia of the kidney pelvis The signs and symptoms usually are those of urinary infection The true pathological condition is not usually discovered until operation or examination of the specimen

Frequency That the condition is a rare one is apparent from the small number of case reports in the literature We have after a careful search been able to find 31 true cases of leucoplakia of the renal pelvis To these are added 2 personal cases which bring the total to 33 cases The greatest number of the cases are to be found in the German literature very few being found in either the American or French In his vast experience with renal surgery Israel has seen but such cases

Leucoplakic formation in the urinary tract is to be found most often in the bladder and probably least of all in the ureter Corsdress in 59 collected cases of leucoplakia of the urinary tract found the following

	C
Bladder	37
Bladder and ureter	1
Pelvis	13
Pelvis and ureter	3
Ureter	1
Bladder ureter and pelvis	2
Not stated	2

From this analysis it is seen that the bladder seems to be the site of predilection with the kidney pelvis and ureter next in order The ratio of occurrence of bladder to pelvis is a little more than 2 to 1

Associated conditions Leucoplakia of the kidney pelvis appears nearly always to be associated with a urinary infection For that reason some authors have assumed that it may play an important role in the etiology Calculi and hydronephrosis also seem to be quite prevalent in some cases The accompanying table (Table I) reveals the associated conditions in the 33 collected cases of leucoplakia of the kidney pelvis and may be summarized as follows

	Cases
Cysts	5
Chronic pyelonephritis	8
Hydronephrosis	7
Calculi	1
Tuberculosis	5
Carcinoma	3
Miscellaneous	7

Of the 3 cases associated with carcinoma 1 case was a squamous cell carcinoma of the kidney pelvis (Kischensky) and the remaining 2 were squamous cell carcinomata of the bladder (Rona Richey) It should be noted that all carcinomata were of the squamous cell variety Some authors consider leucoplakia the forerunner of this type of carcinoma

TABLE I—CONDITIONS ASSOCIATED WITH LEUCOPLAKIA OF RENAL PELVIS

No.	Author	Cystitis	T. B.	Hydronephrosis	Calculi or Pyelitis or Hydronephrosis	Stone	Carcinoma	Lesion of Ureter	Miscellaneous
1	Fox	X							
	Rose		X						Ovarian tumor
3	Rose Co.	X		X					
4	Rose	X							
5	Clark	X			X	X		Lower end of ureter	Ovarian tumor
6	Carabrese			X	X				
7	Cumming	X		X	X	L. Stone			
8	Thomas	X							
9	Pilcher			X					Cyst in pelvis
10	Pilcher							Ureter	
11	Hunt	X				X			
12	Hunt	X						Bladder and ureter	
13	Hunt					L. kidney		Bladder and ureter	
14	Thomas et al			X					
15	Thomas et al	X						Bladder	
	Israel			X					
	Israel								
16	Kirchmayr								Pseudo kidney pelvis
	Pilcher					Stone in ureter		Low	
	Pilcher		X	X					
17	Rose Cone	X							
	Rose Cone								
	Rose Cone		X						
18	Pilcher								
	Lenhoss		X						Congenital
	Lichtenstein	X							
19	Mayo						Carcinoma		
20	Pilcher								Not stated
21	Pilcher et al	X	X			Stone in ureter and kidney			Not stated
22	Pilcher	X	X	X					
23	Rose	X	X	X	X				Foreign body in pelvis
24	Rose	X	X	X					Stone right kidney and ureter
	Thomas	X		X		Stone in bladder			
	Total	15	8	9	4				

Under miscellaneous were found orthostatic albuminuria (Beer) interstitial nephritis (Braatz) cystitis cystica (Ebstein) double kidney pelvis (Israel) congenital (Leber) foreign body in kidney pelvis (Romiti) calculus in opposite kidney and ureter (Rona)

The fact that infection seems to be so nearly always present has caused some authors to consider it as an irritative etiological factor Corsdress in his exhaustive review gives as important factors in etiology (1) acute or chronic inflammation (2) a tumor proliferating from the mucous membrane and (3) mechanical irritation from stones and from hydronephrotic dilatation

In 7 cases leucoplakia of the kidney pelvis was found associated with leucoplakia elsewhere in the urinary tract In these cases it was either pelvis and ureter or pelvis ureter and bladder It has been said that leucoplakia of the pelvis and bladder do not exist coincidentally except when associated with leucoplakia of the ureter

That leucoplakia of the kidney pelvis tends toward being unilateral is illustrated by Corsdress's figures Of 21 cases involving the pelvis and ureter 18 were unilateral This is of importance since it tends toward making nephrectomy the treatment of choice

Age In the 33 reported cases leucoplakia of the kidney pelvis has been found in patients anywhere from several months to 70 years old The age of the youngest patient was 4 months (Leber) and the oldest 70 years (Halle) A glance at the accompanying chart (Fig 14) shows that the greatest number of cases occurred during the fourth decade of life or early middle age There are only 2 cases which occurred after the age of 50 years (60 years—Recktenwald 70 years—Halle)

Sex Leucoplakia of the kidney occurs equally in both sexes In the 33 cases it was as follows male 15 cases female 12 cases not stated 6 cases Leucoplakia of the urinary tract in general has been found to be more prevalent in males in the ratio of almost 2 to 1 (Corsdress)

Symptomatology The symptoms are neither accurate nor indicative of the true condition In the foreground are usually the symptoms of pyelitis pyelonephritis pyonephrosis cystitis, or lithiasis Dysuria associated with burning urgency hesitancy and occasionally hæmaturia are the usual complaints of patients Lumbar pain and backache varying from the dull heavy type to a typical renal colic may be encountered It has been said that the latter is due to the passing down the ureter of small plaque of cornified epithelium The duration of these symptoms may be over a long period of years gradually increasing in severity Since spontaneous healing has been considered impossible This means unending suffering unless an early diagnosis is made and the correct treatment instituted

The symptoms may be mild at first and pass more or less unnoticed by the patient Later as they become more severe the patient seeks the aid of the surgeon Careful examination may reveal any one of the associated conditions hydronephrosis stone pyonephrosis etc and in most instances the true condition remains undiagnosed until later The introduction of the cystoscope into modern urology has helped to increase the possibility of a correct diagnosis To the experienced cystoscopist whitish or grayish plaques or membranes without blood vessels indicate leucoplakia of the bladder and these plaques may give a clue to the presence of the condition in the upper urinary tract

The urine nearly always shows a marked pyuria and infection Occasional hæmaturia may be present Careful urinary examination in some cases has revealed the presence of plaques as strings of cornified epithelium which were paramount in making the diagnosis of leucoplakia

TREATMENT

The treatment of leucoplakia of the kidney pelvis is surgical if the condition is proven definitely to be unilateral Early diagnosis and immediate nephrectomy will save the patient much suffering

If there is contra indication to the removal of the offending kidney the treatment may be conservative and palliative This has in the past been curettage and removal of the cornifying and desquamating epithelium or lavage with a weak solution of silver nitrate Stockmann's case is reported as having been cured

after 21 lavages of the kidney pelvis with 5 per cent silver nitrate

SUMMARY

1 Two new cases of leucoplakia of the renal pelvis are reported

Leucoplakia of the urinary tract and particularly of the renal pelvis is relatively rare only 33 cases (including our own) having been reported in the renal pelvis

3 Leucoplakia of the urinary tract may be defined as an epidermoid transformation of the mucosa in plaques usually with excessive keratinization and desquamation The condition is generally associated with long standing inflammation calculus formation or other irritation which seem to be contributory factors in its causation

4 The etiology of leucoplakia is unknown The most common theories are that it is (1) a true metaplasia on the basis of chronic inflammation and irritation or the biological process of adaptation to environment in the form of protective cornification or (2) that leucoplakia of the urinary tract arises on the basis of misplaced embryonal rests of primitive ectoderm

5 Leucoplakia of the renal pelvis occurs about equally often in both sexes

6 Leucoplakia of the renal pelvis may occur at any age The greatest frequency is in the fourth decade

7 The symptomatology is that of urinary tract infection (cystitis pyelitis pyelonephritis pyonephrosis) and urinary lithiasis conditions with which it is usually associated

8 The treatment of choice is nephrectomy since the disease is incurable and precancerous Palliative measures in the form of pelvic lavage are probably beneficial only in subduing infection and in that way possibly delaying the progress of the condition The value of radiotherapy is not known Fulguration may be of value in leucoplakia of the bladder but as yet no reports of its use have been found

CASE REPORTS

The important points brought out in the cases reported are briefly outlined below

Case Reported by Beer A man age 63 was had orthostatic albuminuria and at the age of 17 had ery

r fractory attack f ere cystitis Tests for tuberculosis were negative He had no symptoms for the next 2 years when he suffered a sudden attack of left renal colic Plain X ray showed negative for calculi Examination of the urine revealed pe ly white membra floating in the urine which resembled pa fi sha ings They were best seen against a dark background and settling to the bottom Urine culture as stril and guinea pig inoculation negative These membranes on close examination were found to be hyaline in nature with the addition of a large number of the tests for phosphates oxalates urates cystine, etc with answer without doubt indicating C toscopic examination showed normal mucosa except for the left ureteral orifice which was surrounded by a ring of edematous mucosa about 1 cm in diameter The bladder was otherwise normal in appearance Following cystoscopy the patient had attacks of renal colic and passed a urinary sediment containing numerous membranes by 3 inch During the 3 months following cystoscopy the patient had no further symptoms

Case 2 Reported by Beer A man age 35 years had been sick for months with pain in left flank radiating to scrotum The pain was of a colicky character Two months before admission to the present development of frequency with pain and occasional hæmaturia Left nephrectomy was done There was a tuberculous destruction of the pelvis with multiple tuberculous foci In the pelvis there was a large area of leukoplakia about the size of a silver dollar

Case 3 Reported by Beer A man age 35 years had had attacks of right renal colic at the ages of 18 and 30 years Venereal infection was denied He had attacks of colic with multiple blood clots passing at 30 years Thereafter he revealed the presence of white plaques consisting of squamous epithelium and plates of cholesterin red blood cells and pus cells The patient suffered some 200 attacks of colic all Right nephrectomy was followed by death from hemorrhage Autopsy showed hydronephrosis and thickening of the right renal pelvis The latter was covered with a white membranous material of the color of pearl The right kidney and ureter were tuberculous

The diagnosis was leukoplakia of the renal pelvis

Case 4 Reported by Braasch A woman age 33 years had had pain in the right kidney region for a long time which became more frequent during pregnancy She had attacks of renal colic and the passage of large amounts of desquamated epithelium She had bladder distress for years duration and had repeated attacks of hæmaturia and vomiting The urine contained pus Right nephrotomy was performed The mucous membrane of the pelvis was thickened and had the appearance of stratified squamous epithelium There was found an associated interstitial nephritis

Case 5 Reported by Chetwood A woman age 34 years suffered from chronic pyelitis and pyuria and cystitis Both renal pelves were dilated An ureterogram revealed the presence of a thickened whitish colored membrane of the pelvis with the appearance of stratified squamous epithelium There was found an associated interstitial nephritis

Case 6 Reported by Cordes (Hosemann) A woman age 45 years had had left renal colic for 3 years with no hematuria or calculi The urine was cloudy Cystoscopic study showed the left kidney to be affected Left nephrectomy was performed The pelvis and calyces were somewhat dilated The mucous membrane was smooth and blush red in color At the upper pelvic junction was seen an island of white opaque cornified epithelium which projected into the pelvis and encircled the ureter The area of flattened epithelium was 4 to 5 mm in diameter The ureter was practically filled with epithelial plug There was much round cell infiltrati

CASE 7 Reported by Cumming A man ge 28 yea s d charged sold e denied nereal infe t on The Wa ser ma n test w s n gative He ompla ed of pain n the pe i m inabil ty to reta n urine blood nd pus in urine pai f l urinatio a d stiff e of neck The present illness began w th rheumat sm in France i 919 le i g him with stiff jo nts a d a wry eck The bl dder sy mptoms b g n w th f que cy burni g and urg ncy a d a l ttle l t r hæmat a and pyuria w e noted Sharp t bbing p rad ati g to the pen s a d left t st cle we also pre e t Cyst tomy wa d ne a d a t e 4 ce timeters n d am t r was moved from th bladd r Wh the wound h l d symptoms recurred Afte b g i bed for a ye r the pat nt was tran fe red t Walte Reed H pital whe he wa ystosc p d a d cyst t s as noted w th n lce t d rea n the t gone ab ut the l ft eteral fice The phe ols lph ephth lein test sh wed a f nct less left k d ey The t t l 2 h ur f nctio was 37 5 per cent Cult ral stud we neg t e a we also all tests for t bercul s Left neph ect my w s done D mbe 7 920 The kidney howed mod te i fi mm t ry h nges The pel w somewhat d lated nd s fill d with bran l ke mat al The t e muc sa w le oplakic r sembl ng sc t l k n i ppe nc The pat t made a good r ery nd th rh mat m a d wry neck left h m

CASE 8 R po t d by Lb te The p tie t age 48 years d ed f mil ry t berc lo i A top y sh ed hr c py htis eteri a d cy tit cyst ca Also n th right k d y pel wa a wh te very sh y heap ng p of orn fied flat pithel um

CASE 9 Repo ted by Ebst n A fem le age 2 ye rs suff ed f om hyd onephr s a d hyd et a d pe i eteri s w th t ict e N cal li wer pres nt Th mucous membra e of the urinary pa ges sh ed ch onic c tar h In definit re i e mall wh te h ny a d are i the kid y p l i nd ur ter g g th m c m mbra e somewhat p p llary pictu e (chole t t m f Rok t ky)

CASE 10 Report d by F lci I th w ll of a hyd o neph ot c sac h h was lined th flat ep th h m we fou d r nd tnc pithel l el me ts Th p l l ke f m f the p tu thei heen d the h stol g cal ch ct st s d fi th c nd t a a t e cl lest t m ba ed metapla f th p thel m Th s w s pp e tly the es lt f n ph ol th wh h u d th hyd neph s

CASE Repo ted by H ll A mal age 39 y ar had i c ti nc f un e t th ag f 4 years a d ll ma ked cy t t at at wh h t me he h d freque cy d p n on urin t th t rmi l hæm turi Bl dd r t ouble w on t t f m th n F 5 yea b fo c ns lti g the uth h had h d tt k f e al l c a ompa ed by th p ssage f m ll wh te sand g i F a ye r the bl dde ympt m h d be n ry m ked The bladd and left k d ey gi n e pa nf l n palp t n H w s tre ted th l r it at tillat n nd imp ed t m po ly H retu ned to the ho p tal a few m nths l t Th bladd cu tt d through peri al op ni g a d th retbr d l t d Th e pat t g d ally e ke ed a d d ed Autop y h wed a th ck bl dd r w ll Th f nd nd g ter pa t f the p t w ll we o red with e t n pl q es of wh t g y g e h c lor with l r cut edge Th t f th m c sa wa w th ut l e t Th ght ete h d leu plak a th ugh t t ti e c rs The right r n l pel s w s dilated and h d l c pl k lso Th l ft r te p s t d simil r l o to th t f d n th right The l ft pel i was thi ke ed a d dhe ent

CASE R po t d by H llé A m age 70 y ars ga e hist ry f Ne s r nd incont nc f u i 25 ye rs pre ously He had had stricture 20 years previously fol lowed by bl dder tro ble and voided u ine contain g pus blood and soft gra el Late he had an attack of r tention f urine requir g catheteri ati A large calculus was removed from the bladder by lithotap xy Eighteen months later he reente ed the hospit l with p nful urina t on and purul nt ur e He d e i 15 d ys after admissi n Autop y sh wed a conditi n of th bladder i dicat ng chr ic cyst t s with thicke d wall In the lower segment were multipl plaques In the upper we e a m ch smaller number Th plaq es in the lo e segment w e small and circumscrib d Both k dney p lves and ureters showed leuc plakic areas

CASE 13 Rep rted by Hallé The patient was operated upon for calculo pyel neph tis A larg stone m de up of smaller stone was found n the pel s The muc us membrane of th pel s where the stone lay w s th ck white nd h d a hard irregul r surface

CASE 4 Reported by Is el A w man age 50 y ars had a r ght nephrectomy fo py nephrosis followi g an obstet cal cyst t s The kid y show ed multiple ca ities e of which co tained a la ge st ne Th pel is was di lat d 5 times the n rmal size a d t the u ete opel ic ju ction co tinu s with the lower o e half f th p l is th appea ed a d y pearly shi y wrinkl d surface from wh h it was ery easy to p ch off mall lamellæ The ret r was attached t the lo v r pole of th kidney by dhe ons

CASE 5 Reported by I ra l On a female age 49 years a pyel lith tomy a d sec nd ry eph ect my we e done D th f om ræmia followed Tv kidney pel es dil ted pe d to fo ked u et r The pp r p l is nd calyces show a very mooth muc us membra e whil the lo er p l is nd calyces ha e a complete pid rmi ed lin ng un e a d v rucous and co ered with atheromatous mas s

CASE 6 Rep rted by K ch nsky A fem le ge 32 ye rs a sick f r / m nth Ther was a pa nf l tumor n the ght knee a d in th kidn y r gi n She had marked pyuri d ded Autopsy h ed th right kidney a d u eter origi lly hyd oneph ot c b t l ter enc oached upon by the t m The mu ous membrane of the pelvis and ur ter es mbled epidermis The e was i filt at on with cell ol m a d mit tic figure w re pr ent Th re wa mark d i flammati In e ral ar as of the c lyces the pr s of rnific t n wa s m rked a t fill the e t e calyx The e we e s eral ll ma ked are s of corn fi tion in the u eter ev n to the exte t f blocking th ret r w th desq mat d ma ses The left kidney left r te a d bladde sh w d no cornification

CASE 17 R po ted by Kra l The p tie t age 28 ye rs ompl i d f ca al pa n in the right kidn y reg o of se ral years durat on Cystoscop c examination rev al d right kid y le o of d structi e atu e Pyuria w s m ked Right neph ectomy v s d e Th p cimen h ed hydr neph si with ma ked thi ni g of the p r chyma The e w s bsces b twee the lowe pole nd the posterior wall f the pel i e ternally The muco s m mbran f the postern r spect of th kidney p lvis h wed a sharply uti d rh mbo d l le copl kic cast wh ch was pe rly wh te sc ly w th de quamat ng peckl d ma e

CASE 18 Reported by K et chme On a f m l age 4 y ars r ght ephrectomy was d n 3 years befo e for bl dd r d tress A tum r w s r m v d f om th right v ry a d h lf the l ft o ry wa r moved The ympt ms wer not reh ed The sympt ms w r of about 4 years du t on H r sympt ms w e f equ ncy and oct ria w th p n in th bl dd r aggra ated when the bladder w f ll nd wh n she wa on h r fe t and rel eved by

TABLE II—COLLECTED CASES OF LEUCOPLAKIA OF THE KIDNEY PELVIS

No.	Author	Date	Age in years		Kidney	Initial Symptom	Duration	Anatomy
	B	9 4		M l	Left	Orthostatic albuminuria	3 yrs	Typical plaques present.
	Be	4	35	M le	Left	Pain followed by frank renal colic	9 mos	Leucoplakia lower half pelvis about ureteral orifice associated with tuberculosis
3	Beseh	85	35	M l	Right	Attack of renal colic	7 yrs	Hydronephrosis. Pelvis covered with thick fibrous membrane. Also tuberculosis.
4	Braat	1898	33	F male	Right	Attack of renal colic	yrs (?)	Pelvis mucous membrane had appearance of epidermis. Ureter thickened.
5	Chiari	988	3	F m l		Pyelitis dextra		Hydronephrosis. Mucous membrane thickened epidermoid. Also renal calculi.
6	Cursdren (Hosemann)	3	45	F male	Left	Renal colic	3 yrs	Hydronephrosis. Island of flat deposit in mucous membrane. Ureter normal. Almost plugging ureter.
7	Cumming	3	8	M l	Left	Frequency and dysuria	3 yrs	Vesical calculus and typical leucoplakic patches in mucous membrane of pelvis and ureter.
8	Ebstein	88	48		Right			White shiny raised areas of mucous epithelium in right renal pelvis. Also pyelitis ureteritis and pyelonephritis.
9	Ebstein	88		F male				Diffuse small raised areas of shiny mucous membrane. Hydronephrosis and hydroureter.
	Fiori	9 9						Hydronephrosis sacculated with flat epithelium and fountain round pearly like lesions. Old hydronephrosis.
	Hallé	896	3	M l		Incontinence of urine (?) pus and blood	5 yrs	Leucoplakia of right pelvis and diffuse bilateral hydronephrosis.
	Hallé	896	7	M l		Urinary incontinence 5 yrs. Kidney removed 8 months ago	5 yrs (?)	Leucoplakia of both pelves and ureters
3	Hallé	896						Pelvic mucous membrane thick and irregular. Clouded epithelium.
4	Hinman Gibson and Kretzmann	9 3	38	M l	Right	Nocturia	yrs	Entire pelvis covered with thick wrinkled epithelium and hyperemic. Hydronephrosis and hydroureter.
5	Hinman Gibson and Kretzmann	9 3	34	F mal	Right	Suprapubic distress	yrs	Renal pelvis filled with horny scales from pelvic membrane covering pelvic wall.
6	Israel		5	F mal	Right	Peripelvic cysts		Dysphagia pearly wrinkled [illegible] retroperitoneal Pyonephrosis
7	Israel	90	9	F m l				Epithelioma of renal pelvis and bladder. Nephrolithiasis
8	Kushisky	90	3	F m l	Right	Pain through kidney	3½ mos	Carcinomatous [illegible] calyces. Pelvis filled with horny cancerous mass. Infected hydronephrosis.
9	Kroll		8		Right	Occasional pain in kidney	Several yrs	Mucous membrane of pelvis and pelvic wall had leucoplakic area. Infected hydronephrosis

TABLE II—COLLECTED CASES OF LEUCOPLAKIA OF THE KIDNEY PELVIS—CONTINUED

No.	Author	Date	Age years	Sex	Side	Initial Symptom	Duration	Anatomy
	Kretschmer	9	4	F m l	Right	Bladd d tress	3 yrs	La g pat h f l plakia bo t t ropel ic jun tio t ding t ly d ret Alse t hereu l
	K t chm	9	6	M l	R ght	Harm tu ia f ll w g in fl nza	4 y	A ea f l pl kia post ri pel ic wall Hydro phrosis ystitis
	K tt	9 9	35	M le		Cystit d t gu h t w d	½ yr	P l is d with gr la tio I fec io h d d troy d th l pl ki ri g Soft calc l d py ph osis
3	Lebe	883	4 m	F m l				R l papillæ d ly d w h thick wh p d rmis Associa d w h leu plakia f y
4	Lecè	9 3	5	F m l	Right	Sl ht pa in fgh iliac f F eq cy		G pa t f pel h ed t h k k M k d fect I f t d hydr ph tic kidn y
5	Li b w (M rch d)	89	7	M l	Right	Cy t	3 y	G ral zed l copl kia f t G U ea U t al fi t la l l py lo ph t h l eatom f d d f diaph gm
6	M t (M h)	9 4						M ltipl plaq esi pel is d d wn t
7	P ll ek (Kr hm l	9						
8	Reckt w ld	909	6	M l	Left	Bladd tro bl	S ral m	P l d w th l y m mb Hydro phrosis d hydro- t
9	Rich y	9	3	M l	Right	F roxysms f b k b	y	E tir pel ov ed w h f pl kia Hyd phros d infectio
3	Rom t	9	5	M l	L ft	F rs te t ry fi t la f llowing py l t my	6 y	M m mbra f pelvis g yish wh t d b y hk pe l As ocia d wi h f gn body d t e f rm tio
3	R	9	35	M l	L ft			Two-th ds f left pelvis ov d w th th k p m t p th l m S in ght kidn y Hydro ph osis
3	R	9	6	M l	R ght			X ro is f ight pelvi Squa m ll rc nom f bl dd Py l ph t
33	S ockm nn	90		F m l	R ght	Ac t cy t tis	y	Pl q in rin di gnos d l coplakia T d w th la g f 5% $AgNO_3$ d l d

re t d alk li e tre tm nt Cl ts f blood a d cca s n l l g hr ds of fle h like m ternal w e oti d in the uri e X rays wer eg ti for lculu Cysto opy show d n ul r ted bl dde a d tubercle b cilli we e f und in th uri s from the bladd r d right kid ney A typ cal tube culou k d y wa f nd at op r ti n Th pel s sh ed a large patch of le oplakia b ut the r ter pel ic ju t on e te di g p to th mai calyces and d wn the reter fo 15 ce t m ters Th ur ter was not th cke ed

CASE 19 Reported by K tschme A m l age 6 y rs compla d of p in the bladder r gion hæma turi f q e cy u gency te esmus a d pain i th region f the right kid y The prese t ill ss beg n n 9 8 l l g atta k f infl enza At the same t me some cl ts f blood were notic d n the urine fo sever l days Pain in th r ght s de was d ll i cha act rel ev d by catharsis ccurring o ce or twice a m nth and lasti g 3 or 4 days Cysto copy r e led lc rs i the bladde A right pyelog m showed a la ge hydronephro is Nephrectomy wa d n F bruary 5 19 2 Ten days afte ope ation the p tient de eloped phleb tis f the left leg E amination of the kidney sh ed n ar a of leucoplakia n th poster r wall f the pelvis 3 17 c ntimeters above the u eteropelvic j nction me s ri g 17 by 6.4 millim ters There was no evidente of tube culo is

CASE 20 Reported by Kuttner An army officer age 35 y rs suffe ed a gun shot wound of the bladder which r ult d in se ere cystitis He d veloped pain in the right kidney region lasting ¼ years A diagno is of pyo-

nephrosis was made. The ureter was not evidence of calculus. Nephrectomy was performed with difficulty. The pelvis was ruptured. The specimen showed a tomatous masses. Fragments of shining like pearl. The mucous membrane of the pelvis was entirely denuded, epithelium was absent, covered everywhere with granulation tissue. One of the calyces contained a papillary tumor. Malked hydronephrosis. In the cholesteatomatous masses was seen soft yellow concretio

CASE 21. *Reported by Leber. Autopsy. A female age 4 months showed a definite thickening of the epithelium of the renal papillae and calyces. This surface was covered with many layers of cells showing cornification. Numerous intracellular concretions were seen in the eye.*

CASE 22. *Reported by Leclère. A female age 28 years, nine months. Following a full term labor. After a full pain in the right iliac fossa and lumbar region and had frequency of urination. The urine showed pus and shamen but no blood. A palpatile shadow was seen in the right side. The size of a fist. X-ray examination was negative. Ureteral catheterization showed decreased output of urea and chlorides on the right and normal function of the left. Right nephrectomy was done. The kidney pelvis looked dilated and a differentiating greater part seemed transformed into a thin cutaneous covering comparable with a slightly macerated lining of the prepuce or labia minora. The colon bacillus was found only a pure form of the mucosa. The ureter appeared inflamed. The colon bacillus was found on culture.*

CASE 23. *Reported by Lichenwein (Mechanik). A male age 7 years entered the hospital with a diagnosis of cystitis. He returned to the hospital 1½ years later with apparently a vesicovaginal fistula resulting from a perineal operation. Milky urine and cystitis. He reentered the hospital a third time 4 years later with a generalized cystitis, pyuria and hæmaturia. Death was due to cachexia and uræmia. At post-mortem showed chronic pyelonephritis and urethral fistula generalized leucoplakia of entire urinary tract, cholesteatoma of interior surface of diaphragm and limited tuberculosis of both lungs.*

CASE 24. *Reported by Mahon. This is a Mayo case (Fig.). Multiple plaques are seen in the renal pelvis prolonged down the ureter. No case report is given.*

CASE 25. *Reported by Pollack (cited by Kretschmer). The case report was not accessible.*

CASE 6. *Reported by Reckten. A male age 60 years had had bladder trouble for several months. Duration unknown. Autopsy showed left hydronephrosis and hydro-ureter. The pelvis was covered with silvery membrane. Some loose fragments were found at the end of the ureter. There was present in the bladder a well differentiated squamous cell carcinoma.*

CASE 7. *Reported by Rochs. A male age 43 years dated his symptoms from back injury received 2 years ago since when he had periodical periods of paroxysms of pain and typical renal colic radiating down to the genitals. Sometimes yes. Albumin pus blood and mucus were found in the urine of the right kidney. Culture resulted bacillus coli and bacillus coli. The kidney was removed. It weighed 110 grams and was the seat of hydronephrosis. The entire pelvis was covered with a leathery corrugated sheet resembling the skin of an infant's scrotum. There was much destruction of papillae, hyaline at the upper pole but at last fairly normal at the lower pole. Microscopic examination showed chronic inflammatory changes. There was no evidence of tuberculosis. A diagnosis was made of chronic suppurative pyonephrosis and ureteritis with leucoplakia of the kidney pelvis.*

CASE 28. *Reported by Romeis. A male age years was operated upon in 1916 for an affection of the left renal region presenting a urinary fistula and an irregularly enlarged left kidney. The patient was operated upon twice in the year 1921. The first time a calculus (the renal pelvis) was penetrated and the following objects were withdrawn (1) a fragment of a catheter sounding hard cracked and encrusted with calcareous deposits in about 2 centimeters long and of 2 millimeters caliber, (2) a rubber tube 6 centimeters long and 20 millimeters in diameter (3) a rubber tube 5 centimeters long and 15 millimeters in diameter (4) a rubber tube 3 5 centimeters long and 12 millimeters in diameter. At the second operation the pelvis and kidney were excised. The postoperative course was excellent. Radiography showed the presence of but one tube the one encrusted with calculous formation. The microscopic aspect of the mucosa of the renal pelvis was greyish white shining resembling mother-of-pearl and the histologic aspect evidenced a cornified epithelium similar to epidermis confirming the diagnosis of total leucoplakia of the left kidney pelvis.*

CASE 29. *Reported by Rona. The patient was a male age 35 years. The clinical diagnosis was chronic pyelonephritis. The left kidney was medium in size with a fibrous capsule. The calyces were about the size of a nut and were covered with pale red mucous membrane. The kidney pelvis was the size of a pigeon egg and covered with pale red mucous membrane. Two-thirds of the pelvis was covered with thick white pavement epithelium. This led up to the mucous membrane of the ureter which was 3½ centimeters thick. The right kidney was larger than the left. The capsule was thickened and when removed showed an extension of pus from the upper posterior part. There was some pus between the liver and diaphragm. The pelvis was greatly dilated with pus and concretion. The mucous membrane of the ureters showed a length as large as the little finger and was brownish red in color. At the junction of ureter and bladder was a stone the size of a hazelnut. The mucous membrane of the bladder was thickened.*

CASE 30. *Reported by Ron. The patient was a man age 46 years. The clinical diagnosis was pulmonary and genito-urinary tuberculosis. The anatomical diagnosis was purulent pyelonephritis diphtheritic cystitis extending to the muscularis ureteral dilatation with hydroureteritis of the right kidney pelvis and carcinoma of the bladder (squamous cell type). There was no erosion of the ureter.*

CASE 3. *Reported by Stockmann. The patient was a female age not stated. The symptoms of acute cystitis. She was treated with rest in bed, internal treatment and bladder irrigation. A diagnosis of leucoplakia was based on pieces of membrane passed. Cystoscopic examination showed the bladder to be normal. Both left ureteral orifice normal. The right ureter was dilated. The urine of the right kidney was turbid and analysis showed pus. The authorities believes the membrane came from the kidney pelvis. Two types of treatment (5 percent silver nitrate were given. Subsequent examination showed normal urine.*

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SIGNIFICANCE OF BLOOD NITROGEN IN CASES OF CANCER OF THE PROSTATE AND BLADDER

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THE desirability of determining the non protein nitrogen constituents of the blood in certain types of urological cases is being generally recognized and examinations of the blood are not infrequently done as a routine procedure Papers (1 2 3 4) presented at the meeting of the urological section of the American Medical Association last year bring out certain points very clearly

The importance of the determination of non protein nitrogen constituents as a preoperative precaution is emphasized The conclusions are reached that urea is the most helpful single constituent to determine and that retention of urea means bilateral kidney disease whether anatomic or functional We have therefore considered it of interest to publish our laboratory findings with the clinical data on cases of cancer of the prostate or bladder treated at the Memorial Hospital

In prostatic cancer a disturbance of kidney function may be caused in one of two ways The first is by the retention of urine infection of urine so retained and a cending renal infection exactly as in benign hypertrophy of the prostate This type is common The second is by direct constriction of the lower ureters by the growth hindrance to the excretion of the urine from the kidneys and so decreased renal function This type is much rarer because generally only one ureter is involved

A study of our results in prostatic carcinoma shows that 64 per cent of the cases have a urea nitrogen figure of 20 milligrams per cubic centimeter of blood or lower and these cases showed practically no residual urine Twenty milligrams of urea nitrogen per 100 cubic centimeters of blood may be considered as the upper level of strictly normal cases although urea nitrogen often goes up to 25 milligrams per 100 without being significant of any kidney condition Twenty per cent of the cases showed definitely high urea in the blood and most of these had complete urinary retention All of these patients died within a few months after the analyses were made

Case 24 may be used to illustrate bilateral constriction of the ureter This patient came to the Memorial Hospital in August 1921 with an advanced carcinoma of the prostate involving the seminal vesicles and grown through into the bladder Residual urine was 180 cubic centimeters Punch operation was done and radium needles were inserted in the prostate and urethra Subsequent to this he emptied his bladder Suddenly in November he began to pass very little urine Catheterization revealed but a small quantity of urine in the bladder For a few days he passed very little urine but there was never complete suppression (Table I) The case is particularly interesting because of the extremely high creatinine figure 27 milligrams per 100 cubic centimeters[1] which decreased to 7 milligrams per 100 in a week The patient left the hospital but died months later

Residual urine is a complicating feature in only one of our bladder cases and constriction of the ureter if occurring at all is usually unilateral However in our series of 49 cases 42 per cent show a urea nitrogen figure above 20 milligrams per 100 cubic centimeters of blood indicating some retention of non protein nitrogen constituents 10 per cent of the cases show a definitely high urea nitrogen This may be due to some pre existing bilateral kidney disease or the presence of the carcinoma may prevent in some way the compensatory reaction of the kidney whose ureter is not compressed by the growth Accurate determination of the function of each kidney should throw more light on this question

If a bladder tumor is too large to be treated intravesically by cystoscope we operate the operation of choice at the Memorial Hospital being suprapubic cystotomy The tumor is snared off if it be pedunculated and ra

[1] This determination was verified by Prof S R Benedict Cornell Medical School

TABLE I—BLOOD ANALYSES ON BLADDER CASES

N	N pr t in N troge Mg pe	U ea N Mg pe	U ic A id Mg pe oo	Blood Tak D	Operatio Dat	Kind f Operatio	Rem k
	3 3	9		/9	/	R mov l f t m through bd w ll	D ed f pent nitis /
		3 3		7/ 9	7/	Cyst t my	Left h p tal
3		5		9/		Tre ed wi h ra di m	T mo ec dary in prostat
4		5		/	/4	Cy t t my	Left hospital
5		5		/	/ 3	Cyst my	Left hospital.
6		4 7		6/6	6/7	Cy t my	Left hosp al
7		9		8/		Cy t t my	Left h p tal
		6 7		8/			
8		8		/	/		
9		8 6		/	/4		
		8 9		8/8	8/9		
		6 7		7/6	7/9	Cy t t my	Left h p tal
		7	4	/5	/6	Cyst t my	Left h p tal
3		5 4		6/	6/ 5	Cy t my	Left h p tal
4		3		/4	/5	Cy t t my	Died f m t tas l l g /
5		8 9		5/3	6/	Cy t my	Left h p t l
6		8		3/ 3	3/ 6	Cy t t my	Left hospital
7	33 6			3/6	3/9	Cy t t my	Left h p tal
8	4 7			/ 3	/ 6	Cy t tomy	Left h p tal
9	35			/7	/ 6	Cy t my	Left h p tal
	37 9			/ 5	/ 6	Cy t t my	Left h p l
	7	7 5		/ 3			R f sed pe tio
		6		/ 4	/ 7	Cy t my	Left hosp tal
3		8 9		/ 9	/	Cy t my	Left h p l
4	9 5	7 5	4 7	9/ 3	9/ 5	Cy t my	
5	7 9			9/	9/	Cy t my	D ed d betic m / 4
6	3 8	16 3	9	/6	/ 4	Cyst my	Liv g 5 yrs l t
7	9 5	8 9	3 9	7/6	7/7	Cy t my	Left hosp l
8			6	5/	5/3	Cy t tomy	Lef hosp tal
9	31 9	7		/	/3	Cy t omy	Se ou ditio 4 mos lat
				6/7	6/8	Cyst my	Left hospital
		6		6/7	6/8	Cysto my	Lef hosp tal
		6		7/	7/6	Cys my	Lef hosp l
31		3 8		9/			N tio rcinoma too ad ed
3		3		3/ 8	3/	Cy my	D ed 9 mo late
5		5		/ 6	/ 7	Cys omy	Left hospital
6		3		/ 3	6/	Cys my	Left hosp tal
37	3	8		8/ 8	8/ 8	Cy t my	Nearly died the l f hosp al
				4/			
		3		3/ 7			
3		5			/	Cys omy	Lef hospl l

TABLE I—BLOOD ANALYSIS ON BLADDER CASES—CONTINUED

30		6		4/ 1	4	Cystotomy	Left hospital
	4			3/6		Cystotomy	Left hospital
		6		/3	/	Cystotomy	Left hospital
4	2	5 8		4/	6 4	Cystotomy	Left hospital
		7	3 3	8/3			
3	6 3	7	5	3	3	Cystotomy	Left hospital
		7		6/			
	88 4	6 8	7 4	5			Complication poor fixation Bladder ? bleeding Died 5
3	7 8	33 4		/0			Died
6		50		0 5		Prostatectomy	Treated with radium Died
		5 7		0 8			
7	74	39	5 6	3/ 3	3	Cystotomy	Left hospital
		7		5/4	5	Cystotomy	
8				8 6	8 7	Cystotomy	
		67		8/			
		8		8 3			
		90		8 0			
		90		8 8			
				9/			Died ? fall
	3 3		3	7/ 5	7 8	Cystotomy	Left hospital

dium implanted in the tumor base The entire operation takes from 30 to 40 minutes

In this report we do not deal with the final results of the operation that is the control of the cancer but we show the operative mortality together with the blood findings In the 7 cases with urea nitrogen under 15 milligrams per 100 cubic centimeters cystotomy was done and radium implanted and none died One patient upon whom a nearly complete cystectomy was performed died of peritonitis

In 19 of the 1 cases with urea nitrogen between 15 and 20 milligrams per 100 cystotomy was done and radium implanted Two died 1 in diabetic coma (previous to operation he had 5 per cent sugar in urine) and 1 of metastases of the lung

In 9 of the 10 cases with urea nitrogen between 0 and 25 milligrams per 100 cubic centimeters cystotomy was done and radium implanted and none died

In the 6 cases with urea nitrogen between 25 and 30 milligrams per 100 cystotomy was done and radium implanted and none died

In 2 of the 5 cases with urea nitrogen above 30 milligrams per 100 cystotomy was done and radium implanted and one died of uræmia

SUMMARY

Blood urea nitrogen was determined in 25 cases of prostatic carcinoma and 49 cases of bladder carcinoma

In 20 per cent of cases of carcinoma of the prostate and in 10 per cent of cases of carcinoma of the bladder there was a definitely high blood urea

In 41 cases of carcinoma of the bladder which were treated by means of cystotomy and radium implantation there were no immediate deaths from operative shock there was but 1 death due to renal failure 12 days after operation 1 death from diabetic coma

TABLE II—BLOOD ANALYSES ON PROSTATE CASES

N	N prot Mg pe	U N Mg pe oo	U Acid Mg pe oo	D t Blood T k	D t f Ope io	K d f Ope t	R m k
		7		3/3			C rc ma N es d l
		5 4					S m
3		4		7/			C rc m h m ta tase pel
		4 7		/ 4			C m Res l l r
5		5		/			Carc ma N d l
		4 7		9			C ma Ad ed N l l
		5		6			Carc m Ad ed Resid 13
8	3 3	9		5 8			C mpl t io l pra pub dra f ll wi g
9	5	9 6	4	3		B be bl d d k	E rc m S prapubic d g C ld wh h l f
	37			/3			C m Ad d d l
		8 9		3/	3/ 3	Y g P h	Lef D k
		8			/	Y P h	R d l L (h p t l
		8 7		5 7			C rc ma Ad l
	6 5			3 7			C rc m N *j l
5	3			7	8	C t my	C m ? P N es d l
	9			/ 3			
	3				/	Cy t m	R
				3			
7	37		3	5 5	8 3	S p p bac y o my f dra d bl ed	V y la g rc m ec da y bl d l
8	3		3	7 3	7 7	Y P h	C mpl R t t f 3 w k
				8		Y P nch	Resid f Left hosp tal
		6		3	7 6	C m	C rc m Left ho p l
	6			8/ 7	8/ 3	Y g P h	Ad ed rc m R d l D ed 8
	7 6	5 6	8	5		B T be	Ad ed rc m C mpl rc Resid l /4 3 D d 4 7
		7		/			Ad l Co ; l
	8	6		6			Ag 59 y rs Adm ed 8 8 wi h l rc ma d be y d pros Res t 136
		6					
		8		/			
	6			6			V P h C m hos p l / 6 mpl g f pass g l tl m
		5		8			
		7					
		6		5			
	7	6		/8			D l m la
				8			Ad t un m
		6					
				3			/3 Emptying bl dd wi h h
		8					Died C m d /

2½ months after operation and 1 from lung metastases (not recognized prior to operation) 5 weeks after operation

A high urea nitrogen definitely indicates that the kidneys may not stand the strain of operation

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A CRITICAL STUDY SUGGESTING PERSISTENT LARGE THYMUS AS A CAUSE OF CYANOSIS IN NEWBORN INFANTS[1]

[illegible]

[illegible]

tion Birth weight was 10 pounds Baby did not nurse well and died suddenly in cyanosis the day after delivery In the diagnosis there was a question of status lymphaticus

CASE 11 Baby boy No 456724 was born May 18 1923 by normal delivery in good condition Birth weight was 9 pound May 20 a pharyngitis developed and on May 21 there was a cyanotic attack The question of thymus was raised before death A diagnosis of persistent large thymus was made

All these cases were followed by the obstetrical service and also daily by the pediatrics service The diagnoses as is evident were many of them made just previous to death These cases show

1 Cyanotic death

2 Absence in 2 cases of any real or anatomical cause for death on autopsy (thymus not investigated)

3 Difficult nursing on the part of the baby in all

4 Clinical chart normal in 5 of 7 supposed bronchopneumonia cases

5 Diagnosis of bronchopneumonia evidently based on diffuse râles without other signs

6 Cerebral hæmorrhage practically excluded on physical examination and number of days of life without signs or symptoms This must not be overlooked however as a possible cause in some cases

7 Consideration of probable persistent large thymus in only two cases

In contrast to the above cases we wish to report 8 cases observed on our wards and to attempt to draw some conclusions as to probable etiology significance treatment and results

CASE 1 A baby girl No 443475 was born September 24 1922 in good condition Delivery was normal Birth weight was 9 pounds 3 ounces October 1 baby was off the breast The mother had fever cough

October 4 the baby was suddenly seized with severe cyanotic attack with acute obstruction to breathing X ray No 10652C wet plate showed an enlarged thymus with pneumonia in right upper lobe An X ray treatment was given of 4 milliamperes at 10-inch focal distance 3 millimeter aluminum filter 6 inch spark gap 4 minutes in front

During the night of October 4 there was another acute attack carried along with oxygen The next morning the color was better the temperature was 10 degrees and the condition was good October 6 the condition was improving and the temperature coming down The color was better The picture was one of upper respiratory infection October 10 there was continued improvement and the temperature was normal The chest signs were clearing October 13 X ray No 10996 C showed thymus much smaller than at first Another exactly similar X ray treatment was given October 14 the baby was well and back to breast feeding October 17 X ray No 11085 C showed the thymus gone and the stomach dilated On October 18 there was another cyanotic attack On October 22 the baby apparently developed another respiratory infection with temperature 102 degrees Reaction against the infection was feeble The cyanosis rapidly deepened and the child died

Special attention is called to the diffuse râles and the sudden rise in temperature just prior to death with obstruction to breathing and cyanosis which were the only signs of respiratory infection No autopsy

CASE 2 Baby boy No 459942 born July 1 1923 was delivered normally in good condition Birth weight was 8 pound 8 ounces Fifteen hours after delivery I was called to the nursery to observe the baby in cyanotic attacks There were three in rapid succession with marked cyanosis An obstructive type of breathing was relieved somewhat by extension of the head A pediatrics consultation rendered a diagnosis of diaphragmatic hernia atelectasis and thymus July 13 X ray No 23471 C wet plate showed the diaphragm negative an opaque mass in the superior mediastinum (thymus) and mottling of the right apex X ray treatment No 103 was given 5 milliamperes 12 inch focal distance 4 millimeter aluminum filter 8 inch spark gap 5 minutes in front July 14 there was symptomatic relief and the baby was nursing well having no cyanosis or attacks On July 17 the X ray No 23643 C showed no thymus shadow Another X ray was given similar to that of July 13 July 24 he had three choking cyanotic attacks and on July 25 he was discharged on request of the mother to return for X ray treatment

Follow up record July 26 X ray No 23643 C showed slight enlargement in the superior mediastinum on the left Further treatment was considered advisable On July 29 at home he had a bad choking spell was very blue and in slight convulsion On July 30 he was returned for X ray treatment The examination was negative The same afternoon at home cyanotic attacks took place while he was nursing

July 31 X ray No 23643 C showed thymus shadow had practically disappeared X radium treatment was given consisting of 48 milligrams for 2 hours over each of four areas on the back

August 1 the patient returned to the hospital. She gained slightly, the temperature was normal and the throat remained negative. She was discharged to the care of her family physician with instructions to return for observation and treatment.

August 31 the patient returned. She had gained 2 pounds (0.9 kg.) in weight and was in excellent condition. No enlargement of the thymus could be demonstrated by the roentgen ray.

Case 3. Baby Boy No. 45555, born June 20, 1925, was delivered spontaneously in good condition. Birth weight was 7 pounds 14 ounces (3.5 kg.). He was perfectly normal until March 6, when he developed dyspnea, pallor and regurgitated while feeding. No cause was found for the dyspnea. March 8 X-ray No. 15515 showed an enlarged thymus. An x-ray treatment was given (5 milliamperes, 10 inches [25 cm.] target-skin distance, 3 millimeters aluminum filter, 5 minutes in front and back). The baby improved gradually and was discharged March 20 with the thymus shadow normal in size. The baby was seen at intervals for a month, during which time it remained well and gained steadily in weight.

Case 4. Baby Boy No. 45555, born Feb. 28, 1925, was delivered spontaneously in good condition. Birth weight was 7 pounds 14 ounces (3.5 kg.). He was perfectly normal until March 6, when he developed dyspnea, pallor and regurgitated while feeding. No cause was found for the dyspnea. March 8 X-ray No. 15515 showed an enlarged thymus. An x-ray treatment was given (5 milliamperes, 10 inches [25 cm.] target-skin distance, 3 millimeters aluminum filter, 5 minutes in front and back). On July 6 the baby was discharged relieved with the mother. July 9 there was recorded a weight gain of 1 pound (0.45 kg.). The baby was well when seen August 1. The x-ray shadow showed no thymus shadow.

Case 5. Baby Boy No. 45555, born Feb. 28, 1925, was delivered spontaneously in good condition. Birth weight was 7 pounds 14 ounces (3.5 kg.). He was perfectly normal until March 6, when he developed dyspnea, pallor and regurgitated while feeding. No cause was found for the dyspnea. March 8 X-ray No. 15515 showed an enlarged thymus. An x-ray treatment was given (5 milliamperes, 10 inches [25 cm.] target-skin distance, 3 millimeters aluminum filter, 5 minutes in front and back). On July 6 the baby was discharged relieved with the mother. July 9 there was recorded a weight gain of 1 pound (0.45 kg.). The baby was well when seen August 1. The x-ray shadow showed no thymus shadow.

Case 6. Baby Girl No. 45555, born Feb. 28, 1925, was delivered spontaneously in good condition. Birth weight was 7 pounds 14 ounces (3.5 kg.). She was perfectly normal until March 6, when she developed dyspnea, pallor and regurgitated while feeding. No cause was found for the dyspnea. March 8 X-ray No. 15515 showed an enlarged thymus. An x-ray treatment was given (5 milliamperes, 10 inches [25 cm.] target-skin distance, 3 millimeters aluminum filter, 5 minutes in front and back). On July 6 the baby was discharged relieved with the mother. July 9 there was recorded a weight gain of 1 pound (0.45 kg.). The baby was well when seen August 1. The x-ray shadow showed no thymus shadow.

Case 7. Baby Girl No. 45555, born Feb. 28, 1925, was delivered spontaneously in good condition. Birth weight was 7 pounds 14 ounces (3.5 kg.). She was perfectly normal until March 6, when she developed dyspnea, pallor and regurgitated while feeding. No cause was found for the dyspnea. March 8 X-ray No. 15515 showed an enlarged thymus. An x-ray treatment was given (5 milliamperes, 10 inches [25 cm.] target-skin distance, 3 millimeters aluminum filter, 5 minutes in front and back). On July 6 the baby was discharged relieved with the mother. July 9 there was recorded a weight gain of 1 pound (0.45 kg.). The baby was well when seen August 1. The x-ray shadow showed no thymus shadow.

Case 8. Baby Boy No. 46054, born July 22, 1925, delivered spontaneously in good condition. Birth weight was 6 pounds 14 ounces (3.1 kg.). He was perfectly normal until March 6, when he developed dyspnea, pallor and regurgitated while feeding. No cause was found for the dyspnea. March 8 X-ray No. 15515 showed an enlarged thymus. An x-ray treatment was given (5 milliamperes, 10 inches [25 cm.] target-skin distance, 3 millimeters aluminum filter, 5 minutes in front and back). On July 6 the baby was discharged relieved with the mother. July 9 there was recorded a weight gain of 1 pound (0.45 kg.). The baby was well when seen August 1. The x-ray shadow showed no thymus shadow.

focal distance 4 millimeters aluminum and leather filter 8 inch spark gap 3 minutes in front It was discontinued after 3 minutes because the tubes were overheated On July 27 continued severe attacks of cyanosis and an X ray treatment was given of 5 milliamperes 12 inch focal distance 4 millimeters aluminum filter 8 inch spark gap 3 minutes in front and the same dose was applied for 6 minutes to the back July 28 The patient s cyanosis gradually cleared during the 12 hours following treatment July 30 he was practically free from cyanosis and supracardiac dullness was almost gone An X ray No 23896 C was taken and radium treatment was given consisting of 48 milligrams for 1 hour to each of four areas on the front of the chest August 5 no more cyanosis was present and as the baby was gaining and nursing well it was discharged The X ray No 23896 C showed slight thymus shadow

In all the above cases except as noted in Case 1 the clinical charts were normal there being no temperature reactions or physical signs indicative of upper or lower respiratory infections and no traumatic history or definite evidence of cerebral hæmorrhage although this possibility must be considered (1)

Thus these two series appear similar in these respects

1 Cyanosis with breathing of an obstructive type except where cyanosis was noted early

2 Difficult nursing by the baby

3 Normal clinical charts

4 Absence of definite evidence of cerebral hæmorrhage

In some cases in the second series rales were found but were considered tracheal or bronchial without localizing signs The two series differ in these respects

1 X ray treatment with or without positive plates was given in all cases with marked symptomatic improvement in all cases especially in Cases 2 3 6 and 8 in all of which the patients were *in extremis* when treated

2 Death resulted in only two of the cases The patient in Case 1 unlike the one in Case 2 had no secondary treatment when the cyanotic attacks recurred and in Case 7 death was a result of pneumococcus septicæmia there being no relation to the thymus condition

TREATMENT

Glandular structure has a peculiar susceptibility to radiation either X ray or radium Each of these therapeutic agents has its followers Even if the gland is destroyed which should never occur with the proper dosage experiments on animals have shown that no harm results The amount of treatment given is never enough to do harm to any of the structures in this region provided the thyroid area is well screened with lead A dose sufficiently large to inhibit glandular activity is usually enough to produce results

Some roentgenologists believe that a large thymus cannot be demonstrated but autopsy findings have revealed them repeatedly and certainly the abnormally wide mediastinal shadow diminishes in size under treatment coincident with the improvement in respiratory and circulatory distress In some instances it is very difficult to demonstrate the enlargement especially if it is in the anteroposterior direction At any rate if radiation produces appreciable benefit we feel that we are justified in treating all such doubtful cases

CONCLUSIONS

1 In newborn infants who develop cyanosis whether constant or intermittent in attacks in the absence of other definite cause persistent large thymus should always be suspected Such infants even *in extremis* should be given the benefit of X ray or radium therapy Plates should be taken before and after treatment to follow results However negative plates do not mean no thymus pressure as it is anteroposterior thickness and weight of thymus not width which causes pressure (2 3) unless the symptoms are due to an endocrine substance (4 5)

Diagnoses of bronchopneumonia obscure intracranial hæmorrhage and congenital heart disease should not be made without more seriously considering persistent large thymus as a cause of symptoms (6 7 8)

3 Because of recent work indicating persistence of the thymus gland as a relatively normal condition cessation of symptoms following X ray treatment must be considered the more reliable criterion of diagnosis rather than the positive X ray picture

4 Treatment as outlined is advised with careful follow up record to establish most favorable dosages

5 We have found the treatment of definite value and believe we have lowered our infant mortality thereby

Relief while not immediate occurs within a few hours and the treatment is certainly without danger

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DEPARTMENT OF TECHNIQUE

A NEW METHOD OF RESECTION OF UPPER MAXILLARY WITH LOWER FACIAL FLAP

BY EMILE FAUVERS M D COURTRAI BELGIUM

THE incision used in an operation should be designed not only to give a wide exposure of the parts involved but also to spare the superficial planes

Langer has demonstrated that the folds of the skin follow definite lines of tension corresponding to the direction of the hair He therefore infers that by following the distribution of the hair and the ply of the skin the incision would easily reunite and the line of incision would not be very noticeable

Kocher has developed Langer's idea He has proved that the superficial vessels and nerves generally run in the same direction as do the lines of tension of the skin He formed the principle of normal incision In the words of Kocher

Dieselben zeigen fuer die betreffende Koerperstelle die Spaltrichtung der Haut an und sind zugleich so angelegt dass dem Verlaufe wichtiger oberflaechlicher Nerven und Gefaesse Rechnung getragen ist

The branches of the facial nerve and the passage of Stenson's duct should be taken into consideration when it is necessary to incise the skin to reach the solid mass of bone of the face An æsthetic result is the reward for so doing

At present two incisions are in favor The incision of Velpeau is made in the form of an arch from the cheekbone toward the commissure The incision of Ferguson is angular and starts at the cheekbone follows the lower edge of the orbit to its inner angle then descends vertically along the insertion of the nose rounds the insertion of the nostril and ends in the middle of the upper lip which it cuts quite through Both lines of incisions must result fatally in sectioning certain cutaneous muscles and thus affect the expression of the face and the play of the features Moreover these incisions leave scars the retraction of which very often causes ectropion

To avoid this unfavorable outcome we have striven to cut away the soft parts in a mass which in one big flap comprises the whole of the cutaneous muscles the facial nerve which supplies them and the entire length of Stenson's duct The flap which is obtained in the course of hemiresection of the lower jaw is of similar form Therefore to separate the massive bone of the face it is necessary to go through the gingivolabial cul de sac and to follow the detachment to the edge of the orbit In fact Velpeau reached the maxillary sinus by the mouth

Here is the process which we have adopted

A vertical incision is made which splits the lower lip on the median line and descends to the mandibular symphysis is continued along the lower edge of the maxillary to the angle of the jaw then up along the posterior edge of the ascending branch to the lobe of the ear The incision goes through the soft parts to the bone (Fig 1) The limits of the flap are marked and it is raised under the mandibular periosteum The masseter is sectioned and great care is taken to maintain continuity with the periosteum The lower gingivolabial cul de sac is entirely cut and the flap is thrown upward The upper gingivolabial cul de sac is now cut from the curb of the lip to the retromolar space (Fig 2)

The antero external surface of the maxillary is exposed and denuded close to the bone or under the periosteum according to the case The infraorbital nerve is cut at the foramen As the cutting proceeds the flap is raised higher forward and backward A blunt retractor raises the entire content of the orbit including the periosteum Sharp instruments cut away the osteocartilaginous formation of the nose in front and the molar bone at the back The flap is then covered with compresses (Fig 3)

The following steps are absolutely identical to those which are described in the classical resection The section of the maxillomolar attachment the section of the ascending branches of the maxillary the section of the palatal apophysis and the severance of the pterygoid attachments present no particular difficulty

The flap is turned down after extraction of the maxillary mass The mucous membrane of the







I g I th rd secti

e l d a n m sc r de th cheek S ct n f the f l t l er ma l m nth l ef r h d p d m ffi ct e l ful p t f Valle e e m g e pt t the m l r p t Ch a f the culoc rd c efle c d d th p hyg aph s q l i both eve The W rma n ctio wa n g tu e The b e ce f the up a-o b t l p t a l th en lity f the c lo rd c ch n a pr l th ou l s f the pl th lm c erve Th u te f th ma d bul po nt nd f motor d o d s pr d th sou d es of th lo m ll y n rv Th upp m ll y rve was th f r the ly j ed The m lar po t sted Th point nde th o bit l p e e t fo t e med to p t t the tu f th f -o b t l r D g Ma ill y p n t t as aite ffe t of p rul t sit th mp e g f th b an h s f the uppe yg mat a d d t l rve l f ct th l ph oscope sh wed cert n p ty f the l ft m ill y

Oper t Subperiosteal e t on f th left uppe ma ll y fte b d g f th e ter l ot l Th e w s y l ght hæm h g St tch g with ut d ge was d e Th w mm d te el ff mp d pe t e h l g w ffe t d a f t ight F mu ed t th en l f th y the mu le f th fa pe f tly so d b t th g t d l ttl yg m t c m scl ffe t d by th f m f th h ek Th tg og ph r e l d pa t l b v g er t n a d sl ght g g f th fl ing f th b t Th m ll y ma as mp t

We have twice resorted to ligation of the external carotid This binding is not indispensable Recommended formerly by Kocher it lessens the hæmorrhage considerably in the course of the extraction of the maxillary The vitality of the flap liberally guaranteed by the anastomose of the two facial and the two temporal arteries is not affected in the least

The incision which we made in the case of unilateral resection of the upper jaw may be advantageously enlarged should the whole of the upper jaw be involved We made the experiment on a corpse

The incision descends along the posterior border of the ascending branch on one side spreads like a bow from one angle of the jaw to



F 4

the other and goes upward along the posterior border of the ascending branch to the lobe of the ear of the opposite side

The flap thus outlined is raised under the periosteum The lower gingivolabial cul de sac is cut as far as it extends The big flap turning on its neurovascular hinge is thrown upward The upper gingivolabial cul de sac is cut from one retromolar space to the other

Then follows the denudation of the antero external front of the bony mass Gradually the nasal cartilages are dissected from around the piriform orifice The detachment of the periosteum is continued on all sides of the lower coat of the orbital projection The dissection of the orbital septum stops on a level with the external and internal palpebral ligaments A blunt retractor lifts the contents of the orbit This raises the eye a little The lacrimal sac included between the direct tendon and the reflected tendon of the orbicularis thus automatically excluded from the field of action (Fig 4)

This is a very extensive and easy method of operating on the facial skeleton and on the orbital nasal and buccal cavities Two of these cavities the nasal fossa and the mouth contain even under normal conditions an extensive microbic flora which may complicate operative after effects This danger cannot be averted but it can be reduced to a certain extent by adequate



Fig. 5. Photograph of patient.

pre operative preparation. This preparation consists in a methodical examination of the respiratory organs. The patient is then sent to a dentist for the extraction of decayed teeth and the removal of tartar. In the week before operation the patient must use an antiseptic collutorium and on the day before the operation he is given an injection of anti streptococcic serum according to Denys. When the operation is finished a plentiful flow of saliva is assured by giving the patient chewing gum. The mechanical chemical and bactericidal action of the saliva is well known.

SUMMARY

The process which we have inaugurated guarantees the integrity of the cutaneous muscles and of the facial nerves which supply them. The postoperative control testifies to this. Besides it must be so. In fact the line of incision marks the entire limit of the mandibular and the primitive hyoid arches. When the incision of Ferguson Velpeau and the one which we have put forward are illustrated by a schematic drawing showing the distribution of the nerves controlling the face we see that the three outlines spare the radicular territories. In fact the cutaneous elements of the frontal process the maxillar and mandibular arches with their sensory branches are placed contiguously. When the same incisions are made on a schematic drawing representing the ramification of the facial it is not the same. That is due to the fact that the muscular elements of the facial arches with the motor branches which innervate them have undergone an interpolation. Futamura proved that the muscular facial arches are invaded in the course of the ontogenesis by the muscular elements of the hyoid. The mimic muscles dragging along the facial cover up the masticating muscles innervated by the lower maxillary nerve. According to that the incisions of Ferguson and Velpeau made from the face itself fatally injure certain cutaneous muscles and some facial fibers. The incision made along the line of the face and of the cervical region necessarily avoids both.

It is to be assumed from the preceding facts that there is an advantage in surgery of the skeleton of the face in cutting a facial flap which can be balanced at will on its own neurovascular hinge. Generally speaking there is an advantage in making the incision of the different planes at the limit of their respective segmental elements. The injury to the organs and to the essential neurovascular connection is therefore certainly avoided. This principle completes Kocher's idea.

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TURPENTINE BY INJECTION IN THE TREATMENT OF EPIDIDYMITIS[1]

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EPIDIDYMITIS is a rather common complication in gonorrhœa It occurs in about 20 per cent of the cases and although trauma plays the most important part in the etiology epididymitis may develop in spite of the utmost care and gentleness in treatment

Of the five classical symptoms of rubor calor tumor dolor and functio læsa the pain in epididymitis is the most distressing inflammatory reaction It is caused partly by the tumor like swelling of the epididymis pulling upon the cord and partly by pressure exerted by the narrow inguinal canal upon the swollen plexus of the vas and is usually controlled by proper elevation and immobilization However there are exceptions to this rule and not infrequently we are confronted with excruciating pain radiating up to the loin which is not relieved by our routine methods This experience in cases where the inflammatory process involves the lymphatics and nerves up to the plexus pudendus lumbalis and renalis a process that cannot possibly be influenced by the use of the Jock strap or any other scrotal bandage Still less adequate are the antiphlogistic measures at our disposal such as the ice bag or the various resorting ointments containing ichthyol salicyles or guaiacol The vaccines on the other hand are not always to be relied upon for their efficaciousness The disappointing results following these therapeutic measures led to the adoption of surgical procedures such as puncture of the epididymis epididymotomy etc which although they may well serve certain indications seem to us too heroic for use in a comparatively self limited disease The present study has been undertaken with the object of ascertaining the value of turpentine injections in the treatment of epididymitis

HISTORY AND PHARMACOLOGY

Turpentine is a product of the various species of the pine tree The oil of turpentine is obtained by distillation and represents a mixture of several hydrocarbons of the formula $C_{10}H$ It belongs to the large group of essential oils Through re-distillation with lime water the so-called rectified oil is freed of the acetic and formic acids In common with other volatile oils turpentine develops an irritating action on the tissues and produces local hyperæmia When given per os turpentine is known to stimulate bronchial and renal secretion while toxic doses are followed by hæmorrhagic nephritis anæsthesia and paralysis It can be easily resorbed from the skin or any other place of application Turpentine is eliminated chiefly through the kidneys whereby the urine retains a special odor of violets Traces of turpentine are eliminated by the lungs

In medical practice turpentine has been prescribed as rubefacient and irritant as pulmonal antiseptic and expectorant as cholagogue cathartic and anthelmintic and is the oldest known antidote in phosphorus poisoning In urology turpentine has been used as diuretic and its analogues Juniper and savin are resorted to quite frequently In the so-called essential and idiopathic hæmaturias turpentine given per os controls the hæmorrhage However the scope of its use has been enlarged with the introduction of the injection method

THE USE AND ACTION OF TURPENTINE BY INJECTION

Fochier[2] in 1891 was the first to recommend turpentine injections in sepsis His method was discarded because extremely painful abscesses followed the subcutaneous injections Klingmueller[3] in 1917 succeeded in eliminating these complications He advised a special technique which tends to avoid the subcutis with its abundant blood and nerve supply in favor of tissues where inflammatory reaction is less likely to follow The fascia over the pelvic bone beneath the brim of the pelvis has proved most suitable for the injections Klingmueller recommended turpentine by injection for certain dermatological

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[2] Fochier A Thèse de Lyon 1891 Abstract in Semaine méd 90 11 55

[3] Klingmueller L Ueber Behandlung von Entzündungen der Prostata und Samenblase mit Terpentin Ein Beitrag zur Therapie der Gonorrhöe Deutsch med Wchnschr 1917 43 1194

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conditions Since then satisfactory results have been reported from other fields of medicine and surgery The best results have been claimed in the staphylomyco is in some of the gonorrhœal complications and in the bacillus coli infections The action which the injections exert upon the organism i a many sided problem

It is certain that turpentine by injection does not act on a purely chemical ba e Minute quantities of turpentine oil suffice to call forth a reaction which i not intensified in proportion to the increase l do e It is likewise of interest that do es exceeding 10 cubic centimeters when given parenterally are not followed by any of the toxic symptoms which usually attend the oral administration of a similar dose Thi proves that in explaining the action of the injection other factors Le ides the chemical qualities of the drug have to be taken into consideration

Another point which di tingui hes the e injec ti ns from the vaccines for in tance i the lack of specificity of the former Turpentine by in jection does not act as an antiparasitic It has no direct bactericidal properties however effi cient it has proved in a number of bacterial and toxic conditions It action i not limited to any special di ea e or any special organ It is rather a general reaction of the body that follows the injection The reaction may be conceived as a biolo ical response of the body the resi tance of which is being strengthened and its defensive forces stimulated to hyperactivity Thi is of ultimate benefit to the diseased focus The in flammation sub ides and the inflammatory prod uct are resorbed whenever morbid conditions favor such action

It is too soon to ay in just what manner thi i done However there are a few ob ervations which throw some light on the subject Among others the following is of pecial interest In his experiment with the injections of an emul ion of turpentine oil into a guinea pig Heinz[1] found a marked increase of the leucoblastic ti sue of the bone marrow Other author have emphasized the presence of leucocytosis following the tur pentine injection in man Proper doses of tur pentine are apt to call forth mobilization of the leucocytes which i of ultimate benefit to the di ea ed focu Increased growth of granulation tissue and rapid healing of ulcerations i another product of turpentine stimulation The antigen and op onins are likewi e timulated to hyper activity However the m ost remarkable effect of turp entine given b y injection i that of analgesia A short interval of slight di comfort (negative phase) lasting between 6 and 12 hours is usually followed by complete or partial cessation of pain in the diseased focus This has been ob erved in the painful ulcers of the leg as well as in epididy mitis a case of which we report below Analge ia is accompanied by euphoria and a feelin of general relief Some authors a sert that these changes are due to disturbances in th colloidal composition of the blood plasma or to direct stimulation of the vasomotors However these are problems for further research

PERSONAL EXPERIENCE

Our report is ba e l on over 120 ca es subjected to treatment with turpentine injections These include a number of cases of acute and chronic gonorrhœa and its complications such as pro ta titis ve iculiti and gonorrhœal rheumatism In those cases turpentine proved le s efficient than the vaccines Acute urethritis was an exception One to two injections checked the discharge to such an extent that one could almost speak of a dry urethritis However the gonococci d d not disappear from the mucous membrane nor has the cour e of the di ease been influenced to any noticeable extent Bubo with a few excep tions responded well to turpentine injections Our largest experience was with epididymiti Al together 100 cases of epi hdymitis were subjected to that treatment during a period of 2 years

As far as technique i concerned we have fol lowed Klingmueller s original method Accordin to this authority the site of the injections i determined by a horizontal line drawn from the po terior axillary border and a line figured two fingerbrea lth beneath the brim of the pelvi At the intersection of these two lines in a certain depth the point of the needle tr kes the perio teum upon which the injection is administered As for the preparation we have u ed a 10 per cent emul ion of rectified turpentine oil in terile olive oil Thi emul ion has been injected in doses of from 0 5 to 1 0 cubic centimeter at a time The injection were repeated every othe day In the many hundred injections not one case of abscess formation or infiltration coul l be noticed A few incidents of tenderness in the vicinity of the injection experienced by some of our patients was invariably traced back to the employment of a faulty technique b one of the as istant The pain subsided in 4 hours without ill effect Some of the injection caused numbne of the leg which u ually di appeared in from 1 to 2 hour Intramu cular injection prove l some what tender but likewi e free of complications

[1] Ber R Med Ph m k h ne J h esh f l
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The number of injections varied between one to seven in a case Usually three to four injections sufficed and it is our conviction that in case the first three injections had not been followed by an adequate change in the inflammatory process it is futile to attempt further trial Of such failures we have had six altogether Adding to them eleven cases which did not appear for further treatment after having received one injection we can safely state that at least 83 per cent of our cases have been benefited by the turpentine injection Most of the cases came to us between the third and eighth day of the onset that is to say when the inflammatory reaction was on the verge of development In round figures in one half of the cases one injection sufficed to bring about the desirable change in the inflammatory condition almost with the suddenness of a crisis Six to eight hours after the first injection all pain stopped or was alleviated to a great extent and the epididymis could be palpated without eliciting appreciable tenderness The inflammation subsided rapidly and adhesions did not appear during the first 48 hours The size of the swelling reaching that of an adult fist shrank within days following the injection to one half or so of its previous size However there were exceptions to the rule In about 20 per cent of the cases in spite of the rapid disappearance of the pain the reduction in size was less noticeable the latter being either little affected or the involution pursuing a slow course But even under those circumstances the patients were able to go about their work without discomfort Another point worth mentioning is the observation that final resolution of the nodules and scars which remain after the acute onset of the epididymitis has subsided should not be attempted with any number of turpentine injections In these cases time and resorbtion are the only factors to be depended upon Of similar limitations the prophylactic value of the injection They are powerless in preventing epididymitis and a few recurrences have been observed in spite of the injections Development of an inflammatory reaction with its general and local disturbance seems to be an essential condition in order to produce an effective therapeutic result

A few clinical histories picked at random may be cited as illustrations

Case [illegible] History No [illegible] [illegible] age 35 was admitted to the clinic August 6 1923 His gastrointestinal history [illegible] specific ethiological factors [illegible] On August 3rd he had developed right [illegible] epididymitis the [illegible] reaching the size of an orange The usual therapeutic measures [illegible] The patient then received an injection of 5 cubic centimeters of the turpentine emulsion About 6 hours after the injection the pain stopped and 4 hours later the inflammation had become reduced to one third of its previous size Three injections reduced the [illegible] to a [illegible] treatment of the ulcer by guaiacol was promptly resumed

The next case is interesting in many respects

Case 3 History No [illegible] 44545 Date September 29 1923 The general [illegible] dates back [illegible] About 7 years later he had a second attack [illegible] with chronic epididymitis At present he is suffering from a purulent urethritis described as gonococci Patient was given an injection of 5 cubic centimeters of turpentine with the exclusion of any other treatment local or general When seen 2 days following the injection the tenderness inflammation had subsided all pain had stopped and the induration was reduced to one half its previous size With four injections the epididymitis could be pronounced cured

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Case [illegible] History No [illegible] [illegible] age 44 had contracted the disease [illegible] developed [illegible] epididymitis [illegible] He presented himself [illegible] epididymitis which [illegible] He had not [illegible] treatment [illegible] age [illegible] history [illegible] Wassermann [illegible] positive [illegible] frequency [illegible] The therapeutic measures [illegible] were [illegible] The patient received an injection of 5 cubic centimeters of the turpentine emulsion [illegible] The pain stopped [illegible] The inflammation had become reduced [illegible] The patient was discharged [illegible] August 30 the patient [illegible] symptom

The therapeutic value of turpentine injections is not limited to gonorrhœal epididymitis only We have on record cases of traumatic epididymitis or epididymitis the result of some obscure infection which responded to that treatment just as well The following is such a case

Case 4 History No [illegible] 4264 Male age 44 had contracted the disease [illegible] developed [illegible] epididymitis [illegible] He presented himself [illegible] epididymitis which [illegible] He had not [illegible] treatment [illegible] age [illegible] history [illegible] Wassermann [illegible] positive [illegible] frequency [illegible] The therapeutic measures [illegible] were [illegible] The patient received an injection of 5 cubic centimeters of the turpentine emulsion [illegible] The pain stopped [illegible] The inflammation had become reduced [illegible] The patient was discharged [illegible] August 30 the patient [illegible] symptom

d ct n sp c al p th l gy could be recorded Followi g cy t s opy the p t nt de l ped l ft ided tr mat c ep d dymitis O e inject n cured the inflammati n

SUMMARY AND CONCLUSION

To ascertain the therapeutic value of turpentine injections 100 cases of epididymitis had been subjected to that treatment exclusively

An emul ion of 20 per cent turpentine in olive oil was administered upon the pelvic bone fascia at interval of 2 days each injection containing from 0 5 to 1 cubic centimeter of the emul ion

The injections were followed in the majority of the cases by analgesia and involution of the tumor like swelling In many instances a single injection sufficed to relieve the pain in from 6 to 12 hours after the injection On the average from three to four injections were administered in an individual case

Our experience which is based on over 2 year of careful clinical observation leads us to con clude that turpentine by injection deserves a prominent place in the treatment of epididymiti

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THE MOBILIZATION OF STIFF METACARPOPHALANGEAL JOINTS

By CLARENCE H HEYMAN M D Cle eland O
S As ta t O h ped S y Mt H p l

THE object of this paper is to present a method of mobilizing metacarpophalangeal joints which are stiff in hyperextension and which have resisted all forms of physiotherapy It has been the writer s experience gained at Gen eral Hospital No 6 by a study of a large number of stiff fingers resulting from gunshot wound that good motion in the interphalangeal joints can be obtained by the usual physiotherapeutic methods but now and then we find that the stiff hyperex tended metacarpophalangeal joints have not been mob lized after prolonged massage and manipula tions In these ca es forcible manipulations under a general anæsthetic is often resorted to and sub sequent attempts at motion either active or pas ive is so p inful that the joints soon become iff again In a great majority of ca es success follows con tant traction and a gradual in crease in flexion by means of the so called banjo splint devi ed by Danforth However the writer has had under his observation cases which have resisted all forms of conservative treatment and surgical intervention was certainly indicated

The chief factors producing stiff fingers are lacerations and penetrating wounds of the hand infections fractures of the phalanges and meta carpals and prolonged immobilization with im proper splinting As Steindler ha pointed out a very important and not generally recognized factor causing stiff metacarpophalangeal joints is prolonged immobilization of the wri t in the flexed position The increased tension on the ex tensor tendons pulls the proximal phalange into hyperexten ion The flexor tendons and the lumbrical in particular are at a decided di ad vantage Flexion of proximal phalanx i d fficult

This paper i concerned with those cases in which there is no destruction or disease of the articulating cartilage itself such as occurs in arthritis deformans or following an acute suppura tive arthritis or osteomyelitis and with those in which the cause of the limitation of motion i extra articular Except in those cases in which there has been a destruction or injury to the tendons flexion is prevented by a thickened and contracted joint capsule and not by actual short ening or adhesions of the extensor tendons This was clearly demonstrated in the 3 cases reported Immediately after incising the capsule trans ver ely the proximal phalanx could be flexed to the normal range of 90 degrees A description of the operative procedure follows

A longitudinal incision 1 inch long is made over the dorsal surface of the metacarpophalangeal joint The extensor tendon i retracted to one ide and the joint capsule is exposed Attempted manipulation at this stage of the operation will demonstrate that the re istance is felt to be in the capsule of the joint A sharp tenotome i then used to incise the capsule transversely approxi mately one half it circumference near its prox imal attachment Care must be taken not to injure the articulating cartilage The proximal phalanx i then forcibly flexed to 90 degrees causing a gaping wound to appear in the cap ule The joint can then be put through its normal range of motion with little or no re i tance The subcutaneou ti sues are closed by mean of fine catgut utures and the skin by means of silk wo m gut A firm l andage is applied over a vol uminou dressing hol ing the metacarpopha langeal joints in extreme flexion Care mu t be taken to hold the wri t in dorsal flexion prefer ably by means of a long wide strip of adhe ive

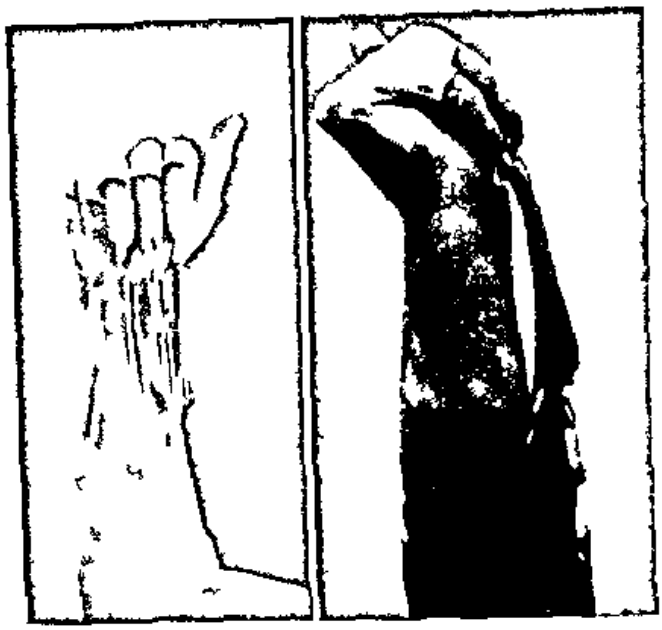


Fig. 1.—Appearance of the modified traction device. Wire hooks are inserted through the tips of the fingers and glove and held in place by adhesive plaster. Fig. 2.—Illustrating the manner of attaching the elastic bands to the metacarpophalangeal joints.

plaster running distally from the anterior surface of the forearm up over the flexed fingers and attached to the dorsal surface of the forearm. The ordinary cock-up splint may prevent a maximum degree of flexion of the fingers and by its pressure into the palm is conducive to atrophy of the lumbrical muscles which play so important a part in flexion of the proximal phalanx.

The reaction following the operation is not marked as in the case following *brisement forcé*. Two days after operation all dressings except a small strip of gauze held over the wound by means of adhesive plaster are removed, gentle passive motion is begun and active motion always toward flexion is encouraged. Massage of the flexor muscles of the forearm and of the muscles in the palm must be done daily. Of particular usefulness during the after treatment is a modification of the banjo splint traction. In civil life I have found the large awkward and conspicuous banjo splint objectionable to sensitive patients. The photographs (Figs. 1 and 2) illustrate the modification which the patient (Case 3) devised for his own use. A section 3 inches wide of the inner tube of an appropriately sized automobile tire encircles the upper third of the forearm. This is just tight enough to prevent slipping and not so tight as to cause a venous congestion. The elastic bands are attached to this cuff into which holes have been punched by means of bent wire hooks. This method of course is useful only when a complete flexion of the proximal phalanx has already been obtained. The patient himself then by extending and flexing the wrist passively manipulates the metacarpophalangeal joints. These joints thus receive passive motion in flexion at all hours of the day and one is not dependent on a physiotherapist who can devote at most one hour daily. The hooks securing the elastic bands are easily removed allowing active motion and massage.

CASE REPORTS

Cases described by W. J. Heyman (misspelled Hymanson) in Recent Surgery of the Hand, J. Am. M. A., 99, 3, 8.

Case 1.—The patient received a gunshot wound of the left hand on July 9, 1918. Transection of the tendon of the right index finger and resection of the head of the metacarpophalangeal joint was done on April 23, 1919. Three weeks after operation he had almost complete function of the fingers.

Case 2.—The patient received an extensive shell wound of the hand on July 8, 1918. Posterior section of capsule was done March 19, 1919. Seven weeks after operation patient could flex proximal phalanges 60 degrees.

Case 3.—The man aged 53 was first examined October 5, 1923, for stiff fingers. On June 1, 1923, he fell and received a compound fracture of second metacarpal bone of left hand. The wound became infected and he wore a palmar splint with the fingers in extension for 4 weeks. He had not been able to close his fist since the splint was moved. He had been receiving physiotherapy apparently now and as referred by Dr. M. Heyde many beneficial progress had been made. The metacarpophalangeal joints of the fingers were held in a slightly hyperextended position and only fragrees of passive motion were possible. Interphalangeal joints could be fully extended and completely flexed. As thorough trial at physiotherapy had failed to improve function of hand, per contra, advised.

On November 3, 1923, a transsection through the capsules of the metacarpophalangeal joints was performed and the after treatment was described above. The patient was discharged from the hospital 9 days later and was able to flex the proximal phalanges approximately 80 degrees. He or the modified traction apparatus for another week and continued treatment by physiotherapy for 4 weeks longer.

He was last examined March 4. The metacarpophalangeal joints could be flexed actively to 70 degrees and passively to 90 degrees, extension now normal.

SUMMARY

Certain cases of stiff metacarpophalangeal joints resist all forms of conservative treatment by physical measures. Satisfactory operative results have been obtained by a transverse section of the posterior half of the capsule of the joint followed by temporary fixation in extreme flexion. The modification of the banjo splint is useful after this flexion has been obtained and is preferable because of its comparative inconspicuousness, simplicity and usefulness in obtaining passive motion in conjunction with traction.

WEARING OF BRANCHING STETHOSCOPE BY SURGEONS AND ANÆSTHETIST DURING OPERATION

BY EVAN O'NEILL KANE M.D. F.A.C.S. KANE PENNSYLVANIA

As an additional protection to the patient under anæsthe ia the surgeons and anæs thetist hould be kept mutually in touch in all serious cases e pecially when the operation protracted when there are cardiac lesion or there any question as to the efficiency of the anæ thetic To safeguard these patients I em ploy a branching stetho cope such as is used by clinical teacher in clas demonstration the only differences being that the rubber tubing is elon gated from 30 to 40 inche and the flat bell of

To insure ab olute asepsis a thin steel drum is sub tituted for the hard rubber di c Thu th entire appliance consisting of metal and rubber tubing can without injury be rapidly sterilized in boiling water

A quickly detachable union a few feet from the stethoscope frees the wearer from his connections with the patient s chest at a moment s notice should he de ire to step back from the table or if the patient s po ition has to be changed consid erably Reattachment i as ea ily accomplished



the stethoscope is weighted sufficiently to fit firmly upon the che t This bell or che t piece held in position by a small adhesive strip and placed *above and a little to the right of the apex* of the heart where cardiac pul ations can best be heard and to some extent respirations The light est spring binaural ear pplian e is used This adjusted to the ears from behind however in stead of in front thus taking the instrument en tirely out of the way the tubing hanging down the back of the wearer In order not to interfere with the hearing only one ear piece may be worn Thu is pressed into the ear by a head band The anæsthetist should have the instrument applied to both ears as it i inadvi able to have their attention diverted to external ound

Instead of a fork a triple branching metal con nection hold a third rubber tubing and ear piece for the a si ting surgeon

In the accompan ing illu tration the screen in front of the anæ thetist and the covering over the patient che t were removed before taking the photo in order to afford a clear view of the instrument and tubing It will be ob served that the tubing is long enough to enable the operator to work conveniently even at the foot of the table without producing traction The tubing running to the anæ thetist need to be only half as lon

The device may appear cumbersome and on first trial may be a trifle confusing but it is sur pri ing how readily the wearer accustom him self to it so that it pre ence is almost forgotten

A NEW AID IN THE DIAGNOSIS OF TUMOR OF THE HEAD OF THE PANCREAS[1]

By DR JACOB BUCKSTEIN NEW YORK
Clinical Gastroenterology U S Veterans Bureau Assistant Roentgenologist Beth Israel Hospital

THE most significant radiological evidence in the diagnosis of enlargement of the head of the pancreas is the concomitant increase in the size of the duodenal curve However this may frequently be difficult to demonstrate by the ordinary method of first filling the stomach with barium The pyloric opening is intermittent and the filling of the duodenum is as a result irregular incomplete and evanescent



Fig The stomach has been filled with barium Only small amount of this barium mixture is projected into the duodenal bulb by peristaltic contraction of the pyloric sphincter As a result the duodenal loop and the descending portion of the duodenum are not clearly outlined in the roentgenogram

In this particular case the difficulty was overcome by passing a rubber tube until the metal tip reached the end of the transverse duodenum as determined fluoroscopically The last ten (10) inches of tube is perforated with numerous small openings Barium was injected through the proximal end of the tube and a roentgenogram taken Not only was the tube well visualized but the barium escaping through the holes in the distal portion of tubing outlined the duodenum

In this manner a much clearer idea of the duodenal curve was obtained than was possible by the ordinary indirect method of barium ingestion The duodenal curve appeared to be enlarged suggesting a tumor of the head of the pancreas as a cause This was confirmed by an exploratory laparotomy performed by Dr John Hartwell



Fig The barium mixture is projected into the proximal portion of the tube filling it completely By visualizing the position of the tube fluoroscopically barium was passed through the proximal end The barium escaped through numerous perforations in the distal 10 inches of the tube outlining the duodenum A clear record of the size of the duodenal curve thus obtained than is ordinarily The enlarged duodenal curve suggested the presence of a tumor of the head of the pancreas This was confirmed by an exploratory laparotomy

It is my opinion that the employment of this method may prove of service in other cases where a tumor of the head of the pancreas is suspected

From the Roentgenological Department Beth Israel Hospital

CORRESPONDENCE

TRIGONITIS AREATA ALBA

To the Editor A vesical lesion which the writer has not seen described in the literature but which is the cause of a definite and extremely annoying clinical picture in women can very appropriately be given the title of trigonitis areata alba It may be merely a milder grade of a condition that one frequently sees described in the literature as leucoplakic trigonitis, pseudo membranous trigonitis (Pilcher) or chronic membranous trigonitis (Wassidlo) If so it only faintly resembles the usual illustrations of these conditions though it gives somewhat similar symptoms Likewise it is unquestionably an entirely different lesion than that known by the gynecologists as cystitis colli In fact if one judged from the ease with which it is cured as compared with the cure of those conditions mentioned one would be led to believe that they had nothing whatever in common

I believe that the new name for the lesion is justified for I feel that it is a separate lesion and though it more nearly resembles what one visualizes as leucoplakias this term has grown to represent patches found on any and all parts of the bladder wall whereas the lesion in question is found only on the trigone True leucoplakic cystitis is a lesion that the cystoscopist would never overlook whereas this lesion is almost always overlooked and is the cause of many sudden attacks of urinary frequency and urgency in women which have for so many years seemed to be without any definite pathological lesion

If in these cases one searches the trigone with the utmost care he will notice beginning at the proximal edge of the ureteral orifice and extending for varying distances toward and at times into the vesical outlet a very slight opacity of the superficial layers of the mucosa The area looks as though it had been touched with a solution of silver nitrate just strong enough to cause the faintest opalescence So faint is it at times that it is visible only to diagonal vision and cannot be seen if the objective lens of the cystoscope is parallel with the mucous surface Among a number of such cases the writer has twice seen these areas surrounded by a very narrow margin of inflammatory œdema and upon several occasions the area was a glistening white and raised above the surrounding mucosa Singularly enough they are generally in front of the right ureteral orifice The rest of the bladder wall is normal

The symptoms vary in intensity as the lesions approach the bladder outlet being very intense if they extend into it The clinical picture that the patients present differs markedly from the slow onset and prolonged course of the other conditions mentioned and is in itself almost pathognomonic Suddenly without apparent cause the patient always a woman is seized with frequent desire to urinate day and night In those patients with the lesion confined to the posterior trigonal angle frequency is the only complaint but when the anterior trigonal angle and vesical neck are involved there are added urgency extreme tenesmus and a burning pain from the vesical outlet to the external urinary meatus at the end of each urination A terminal drop of blood is very rare but has been seen

From the lightning like suddenness of their onset these symptoms continue for days weeks or on rare occasions several months when they disappear with equal abruptness They show a marked tendency to recur and most patients when seen by the cystoscopist have had several such seizures

The urinalysis makes the case very baffling as generally there is present nothing abnormal in the urine It is usual to find that many drugs have been tried and the one being used when the attack subsided was labeled a cure only to disappoint the physician at the beginning of the next attack

Just what the true etiology of these lesions is I am unable to say Of four very closely studied patients three had mildly active pulmonary tuberculosis and one had a clinically quiescent lues A larger number studied with equal care showed nothing that I could feel was a causal factor Considering that the lesion entirely disappears as the result of mild local treatment it hardly seems possible that any condition of great importance is an underlying factor They seem to be more common in the unmarried and have been found in patients from 20 years to 60 years of age

The instillation of a few milliliters of silver nitrate solution into the bladder beginning at ½ per cent and giving as high as 3 per cent at four or five day intervals generally gives relief and clears up the condition As to oral treatment creosote properly given and in sufficiently large doses will give relief far more quickly than local applications in most cases but will not effect a cure More immediate results have recently been obtained by the injection of 5 per cent silver nitrate solution through a ureteral catheter the opening of which is held in close contact with the affected area The bladder should be distended with fluid at the time to dilute the solution as it leaves the bladder surface

Philadelphia P S Pelouze M D

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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OCTOBER 1924

CANCER OF THE UTERUS

HYSTERECTOMY for cancer of the cervix uteri was inaugurated by the vaginal route and resulted in a very few cures largely perhaps because traction on the diseased cervix with vulsellum forceps lacerated the tissue and transplanted the growth into the wound With further experience this cause of failure was recognized and the operation modified The cancer was first thoroughly seared with the actual cautery after which the entire dissection was made with the cautery knife to prevent transplantation of cancer cells The mortality following this operation was low and there was 2 per cent of cures The operation was applicable however only in cases in which the cervix still possessed a certain degree of integrity and the uterus of freedom of movement In cases in which the uterus was fixed and the vaginal wall extensively involved the cautery method without hysterectomy was used cures resulted in a few apparently hopeless cases and there was satisfactory palliation in nearly all

The next step in the treatment of cancer of the uterus was the application of Percy s method of using heat Percy demonstrated that the cancer cell is five times as vulnerable to heat as the normal cell and that heat at 113 degrees F applied for 10 minutes destroys cancer cells This method was used in a considerable group of inoperable cases without deaths most of the patients were free from the disease for prolonged periods and there were a few five year cures

In the meantime the surgical procedure in cases of cancer of the cervix was changed from the vaginal to the abdominal route A stylish operation was inaugurated by Wertheim in which the pelvic glands were removed from situations such that if the glands had been involved in the carcinomatous process operation would probably have been useless The ureters were dissected free from the base of the broad ligament normally the ureters lie only three fifths of an inch from the cervix while in cases of cancer of the cervix they lie practically on the carcinomatous tissue The dissection of the ureters from the infected broad ligaments was the weak point in the Wertheim and similar operations The average mortality was about 0 per cent The percentage of cures was estimated on the recoveries from operation but the patients dead from the operation were just as dead a though they had died from the disease A number of these operations were performed and although eventually the mortality was reduced to less than 5 per cent probably a more careful selection of cases had as much to do with the lessened death rate as improved technique

The treatment of cancer of the cervix by radium afforded the advantages of treatment

by heat but without the risk eliminated the slow convalescence due to the separation of the sloughs and soon became a serious competitor of surgery In most instances radium accomplished all that operation or the cautery accomplished that is it caused the carcinoma to disappear locally with little risk and no serious inconvenience to the patient It has been demonstrated that when the uterus is fixed and the vagina involved radium both for curative and palliative purposes is better than the knife There is no quarrel with the man who believes that radium should be used in all cases of cancer of the cervix and yet with the patient in good condition the vagina not involved and the broad ligaments free hysterectomy has given excellent results too good to be abandoned readily for a new method The surgeon observes apparently inoperable cases in which radium produces very great improvement in the course of weeks or months but does not cure Evidences of the disease in the vagina disappear and the uterus loosens more or less Radium has shot its bolt the disease has become confined but is still present In such cases the return to earlier methods of treatment by hysterectomy has distinct advantage and will usually result in palliation and sometime in cure in selected cases In this type of case abdominal hysterectomy in which the entire cervix and the upper vagina are dissected out with the cautery knife is not extremely difficult sound tissue (ureter) will stand an extraordinary amount of heat

From 80 to 85 per cent of patients with cancer of the body of the uterus who are subjected to hysterectomy remain well Through the lymphatic system cancer is disseminated the bodies of organs have few lymphatics the necks of organs many lymphatics Considering cancers in all situations 71 8 per cent of suitable patients free from lymphatic involvement are cured by operation and only about 19 per cent in whom lymphatic involvement is present Preliminary to hysterectomies for benign as well as malignant disease thorough curettement has been done in a number of cases to determine whether all the mucous membrane of the body of the uterus could be removed but it seldom has been accomplished even though the curettement has been done with disregard of the caution with which the same operation would have been done if hysterectomy had not been immediately contemplated In two such cases the absence of carcinoma in the tissue removed at curettage gave the patient a sense of security which was destroyed only a year later by the necessity for hysterectomy for carcinoma of the body of the uterus

Radium is not an effective agent for treatment of cancer of the body of the uterus In many instances in operating for cancer of the body of the uterus following the use of radium the disease will be found to be completely removed up to a certain point but beyond that point there will be carcinomatous tissues which the radium has not destroyed Since surgical procedures will cure such a high percentage of cancers of the body of the uterus the reasons for using radium must be very definite We do not use radium in cancer of the body of the uterus with the expectation of cure although almost anything may happen in the occasional case

Radium is a powerful agent for good in the hands of the expert but an agent for very great harm in the hands of a man without surgical experience or sound clinical judgment who uses it indiscriminately Few patients should have radium treatment without surgical consultation and the decision as to whether to use radium or knife should depend on the condition existing in the individual case W J Mayo

PYLORIC RESECTION UNDER IN FILTRATION ANÆSTHESIA

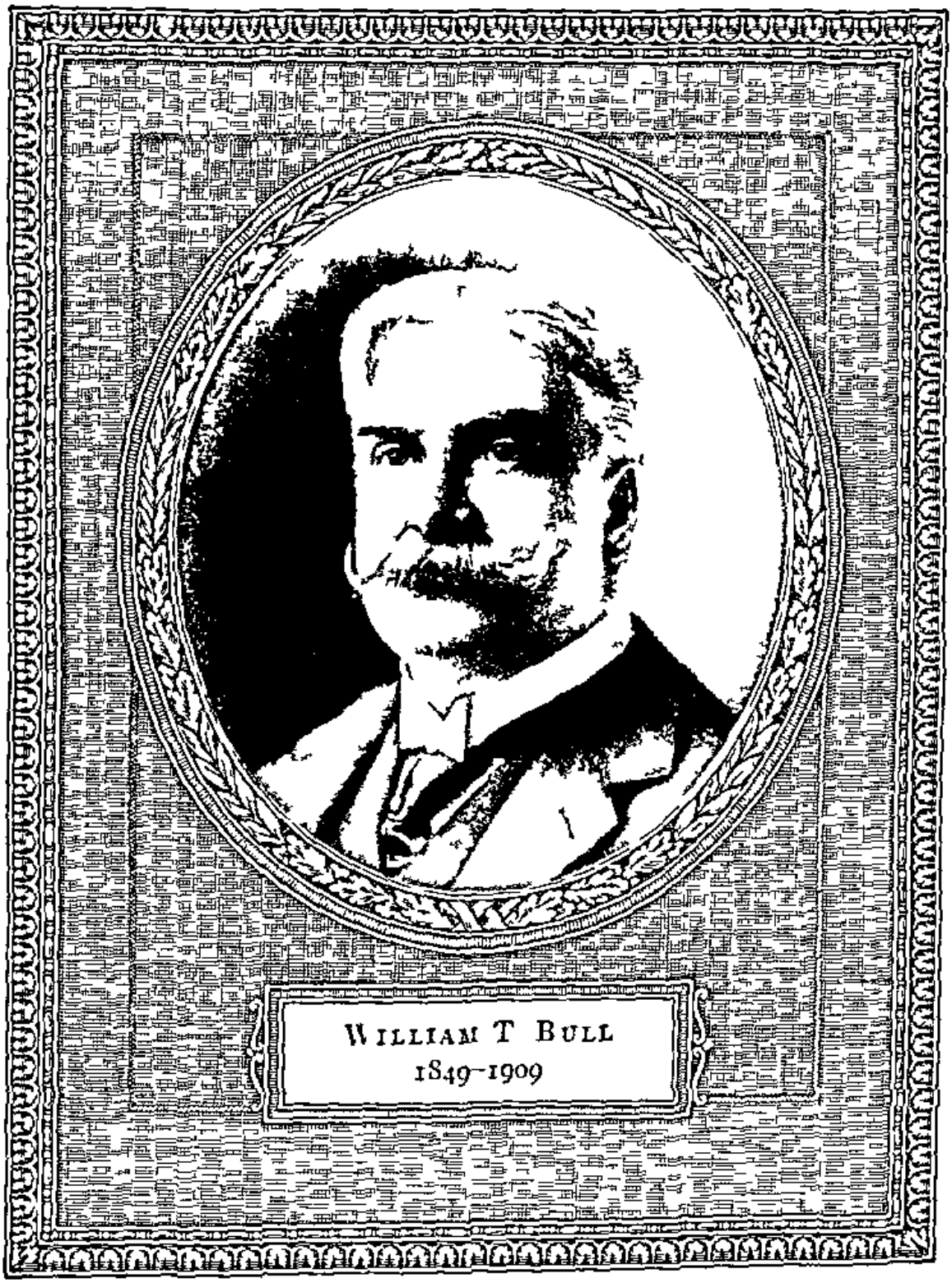
THE rather extensive use of infiltration anæsthesia in the various fields of endeavor to which it seems applicable has stimulated reflection as to its use in pyloric surgery As we know no form of local anæsthesia is indicated in every instance a fact which I am sure should become more deeply apparent as a result of current advances in general anæsthesia especially with reference to the rather recent introduction of ethylene gas The most enthusiastic advocate of a particular form of anæsthesia should be above attempting to limit any needed surgical procedure to the scope of his anæsthetic method A further restraining factor should exert its influence wherever the surgeon cannot be perfectly certain of having a type of patient particularly adapted to the use of the anæsthesia method which he has in contemplation

In the minds of many patients we banish to a great extent the horror of an operation by assuring them that the operation can be performed while they are wholly conscious It may be that they have taken ether on some previous occasion and are therefore perfectly willing to endure a certain amount of discomfort while awake on the operating table rather than experience the postoperative certainties which are associated in their minds at least with the use of ether We should hardly recommend ether for a very slight operation and thus incur the possible results of general anæsthesia at a time when it is hardly justified May we not without seeming inconsistent use the same argument where the operative danger itself is somewhat considerable and refuse to add even the least element of additional risk thereto? It seems to me that to one who weighs all the elements there is every reason for a low operative mortality especially if the outlook be somewhat doubtful as must of course be the case if pylorectomy is done for malignant disease Hence here lies another possible argument against the use of general anæsthesia Quite likely we can apply to this field the argument which exists for cocainizing the brachial plexus previous to an interscapular thoracic amputation At any rate the man who does a pylorectomy using infiltration anæsthesia will be astounded to observe almost complete freedom from any shock syndrome Nor is this all The postoperative convalescence in the few cases under consideration has been particularly uneventful referring to a freedom from complications of a respiratory nature although we are perfectly well aware of the fact that these are in most instances due to embolism rather than to the direct effect of a general anæsthesia upon the breathing apparatus It must be admitted by the ether enthusiast that his patient goes to bed wet with perspiration as a rule and is consequently more exposed to respiratory complications than is the patient who is carried through the long corridors or possibly out of doors with his skin and coverings dry

So far as the technique of administering an anæsthetic is concerned its consideration may well be said to begin with the use of a pre anæsthetic drug we are accustomed to giving morphine enough to dull very perceptibly the patient s interest in his surroundings To this must be added that individual tolerance to this drug varies greatly Infiltration of the addominal wall has frequently been done before transportation to the operating room since a stay in what the patient may be pardoned for considering a chamber of horrors is to be shortened as much as possible in view of the fact that such an operation as that contemplated is rather lengthy at best

One of the first advantages of infiltration anesthesia is found on opening the abdomen for it will be noted that none of the unwanted abdominal viscera is forced into the field by the patient s efforts to get enough oxygen to sustain life *on the other hand it must be* admitted that no exploration of distant foci is possible and none should be attempted unless a general anæsthesia is given In many instances a perfectly loosely attached pyloric tumor can be delivered with only slight transient discomfort while a few inhalations of gas will rob this brief instant of its unpleasantness The mobility of the tumor must be tre sed at this time because the infiltration technique is not applicable to a growth which is to any extent fixed in position However this places no limitation upon infiltration *anæsthe ia since the mobile pylorus is the only* type of pylorus on which resection will often be attempted The physical condition which favors local anæsthesia in any op ration is here pre ented we have merely to elaborate the principle of treating a pedunculated tumor by infiltrating the lesser omentum the gastrocolic ligament the anterior and po terior walls of the stomach and the anterior wall of the duodenum leaving its posterior wall to be so treated after the lesser peritoneal cavity has been widely opened In this simple way we shall have completely encircled the field with a zone of novocain and in many individual will *be able to proceed with the resection and hear* as little complaint from the patient as though inhalation anesthesia had been employed There are indeed few abdominal situations where the control of the sensory nerve supply is so simple but I am willing to admit that many an individual is not at all suited temperamentally to such an extensive and time consuming operation while partially awake

If Billroth No II or Polya Balfour anastomosis be made then a whiff of gas should be administered at the time the jejunum is picked up On the other hand Billroth I or *Kocher anastomosis can be performed* under the protection of the infiltration anesthesia alone The closure of the abdominal wall when infiltration anesthesia is used is facilitated by the active co-operation of the patient if widely enough awake but it is not complicated by the struggles of a deeply etherized patient as is the case when a general anæsthesia is used WILLARD BARTLETT



WILLIAM T BULL
1849–1909

MASTER SURGEONS OF AMERICA

WILLIAM TILLINGHAST BULL

DOCTOR WILLIAM TILLINGHAST BULL after facing the inevitable for several months died in his sixtieth year on February 2 1909 at Wymberly Isle of Hope near Savannah Georgia whither but a few weeks before he had gone to obtain the benefit of the sunshine and warmth

This eminent surgeon son of Henry and Henrietta Melville Bull was born in Newport Rhode Island May 18 1849 His first American ancestor was Henry Bull who in 1609 came from Wales with eight other men the party founding Aquidneck (Newport) The pioneer Bull was a member of the Roger Williams Colony and twice Governor of Rhode Island and the Providence Plantations Land included in his original grant is still in possession of his descendants after a period of over three hundred years Doctor Bull's paternal grandfather a distinguished antiquarian was the author of *Memoirs of Rhode Island* He lived in the family homestead until his death Henry Melville William T Bull's maternal grandfather also of Newport was a student of and authority on Colonial history

William Tillinghast Bull was graduated with honors from Harvard College receiving the degree A B in 1869 in his twentieth year Three years later in 1872 he received the degree of M D from the College of Physicians and Surgeons in New York now the School of Medicine of Columbia University In the same year the degree of A M was conferred on him by his Alma Mater he having taken simultaneously with his medical studies the course leading to this degree The faculty prize of the College of Physicians and Surgeons was awarded to Dr Bull for his thesis on Perityphilitis (Appendicitis) his researches on this subject being inspired by the work of his teacher Dr Henry B Sands whose attainments in technique were a potent factor in the improvement of the surgical treatment of appendicitis

After serving as interne at Bellevue Hospital for the full term of a year and a half Dr Bull went to Europe for further study in his profession Although well versed in the best American surgical methods his alert mind detected the vulnerable points in his training Thus his impartial attitude toward other schools allowed him to recognize and benefit by their advantages In Germany he applied himself to the study of surgical pathology In France under the guidance of

Farabeuf he studied the superior operative technique of the French surgeon founded upon detailed anatomical knowledge Later he went to England and Scotland He was decidedly influenced by the sound common sense of the English school and early became a follower of Lister of Edinburgh

After two years of European study Dr Bull returned to America determined to devote himself solely to the practice of surgery This plan did not receive the encouragement of his elder colleagues for at that time the practice of surgery and the practice of medicine were united in the hands of the general or family physician But with characteristic independence the young surgeon nevertheless held to his determination to specialize in surgery Well equipped with the training he had received in the various schools endowed with well balanced surgical judgment and fine courageous spirit he was able to carry through his plans with signal success

On his return from Europe in 1875 Dr Bull became house surgeon to the New York Dispensary *in 1876 he was appointed surgeon in chief to the Chambers* Street Hospital (House of Relief department of New York Hospital) a position which he held for eleven years (1877–1888) In 1879–1880 he was assistant demonstrator of anatomy in the College of Physicians and Surgeons in 1880–1883 demonstrator of anatomy and adjunct professor of surgery In 1888 he was appointed full professor—professor of practice of surgery and clinical surgery In 1890 he was appointed visiting surgeon to the St Luke's Hospital In 1883 he was appointed attending surgeon to the New York Hospital and continued in that capacity until May 1900 when he was appointed consulting surgeon to the institution

Believing that a surgeon could not at the same time fulfill the demands made by two hospital services Dr Bull resigned from St Luke's in 1883 and was made consulting surgeon there In 1900 he was appointed attending surgeon to Roosevelt Hospital and continued in this capacity until 1908 He was also attending surgeon to the Hospital for the Relief of the Ruptured and Crippled from 1879 to 1909 consulting surgeon to the Manhattan Hospital Orthopedic Hospital and Dispensary New York Cancer now General Memorial Hospital Woman's and States Emigrants Hospitals and also to the Newport Rhode Island Hospital He was a trustee and vice president of the General Memorial Hospital

One of Dr Bull's outstanding gifts was his marvelous skill in teaching This was attested by his great popularity in the class room where his many pupils were fired by enthusiasm both for the man himself and the subjects taught Dr Bull early established a reputation by his epochal work in gunshot wounds of the intestine *and in appendicitis* During his service at Chambers Street Hospital a woman brought in with two gunshot wounds of the intestine died without operation shortly after admission At the autopsy Dr Bull became convinced that

her life could have been saved had suture of the intestines been performed An opportunity to put his theory into practice soon arose when a man was brought in with a similar injury Dr Bull operated upon him successfully Dr Bull s methods in laparotomy were widely copied He was a true chirurgeon—the work er with intelligent trained mind skillful hand and high unwearied zeal in his chosen work

Not often conspicuous in society meetings when he spoke it was with author ity Contributions to medical literature from Dr Bull s pen were numerous not only under his own name but also in collaboration with his colleagues He was a member of the Harvard University Century Strollers and Racquet and Tennis Clubs of the American Surgical As ociation The New York Ac demy of Medi cine The New York Surgical Society Societe Internationale de Chirurgie and several other European surgical societies

Dr Bull s final illness began in April 1908 when a glandular enlargement of the neck was observed Operation followed when the growth was found to be malignant On his return from Newport in the autumn of 1908 he had failed so rapidly that his close t friend knew that his remaining span of life was short but with it all his cheerfulness and optimism never failed On January 20 1909 he was taken to Savannah Georgia but the temporary improvement which fol lowed was but a flaring up of the flame before it was extinguished and he died February 22 1909

Dr Bull was a man apart from the multitude both physically and mentally Nature had endowed him with her richest gifts He was strikingly handsome Not only was he a clever diagnostician a cool deft and skilled operator but he was pre eminently the patient s friend To him the patient as an individual was far more important than the patient as a case Courageous operator though he was he knew when not to operate

The moderation of his fees was noteworthy Loyalty to friends generous acknowledgment of the attainments of others kindly consideration for all with whom he came in contact and inexhaustible sympathy won for him the devotion of men and women of all classes He possessed complete self reliance and poise without conceit As has been well said he was near to the heart of the great community in which he lived His death brought sorrow to the tenements to the man ions of the rich to ob cure wage earners to the leaders of the country s best thought

One of Dr Bull s most noted contemporarie declared that at the end of his own life he could ask for no greater tribute than was paid to the great surgeon at his funeral service I or in that large cosmopolitan gathering in which were a sembled the young and the old the powerful and the weak the well known and the unknown every individual united in a common sorrow mourned the loss of a friend and helper in time of need

JOHN B WALKER

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By WORLD J BROWN MD FACS Omaha Nebraska

THE PLASTIC SURGERY OF TAGLIACOZZI

THE times create the man and the man evolves the method This statement is almost a truism when applied to lines of human endeavor and is no less applicable to science than to other lines A study of history reveals that there is a distinct interrelation of activities of different members or groups of people and the action of one group have a direct bearing upon those of another So in the latter part of the fifteenth and the sixteenth centuries the ever waging wars created the need for men trained in traumatic surgery for the use of gunpowder and the invention of more perfect fire arms had made wounds much more disfiguring rough and severe than the former sword and lance wounds and sling shots The men were forthcoming and surgery advanced through the efforts of Pare and his contemporaries

Plastic surgery had its beginning in a similar way and was due to two agencies First syphilis was rampant especially in southern Europe and though mercury as used to some extent its ravages extended to the tertiary stage and nasal deformities were common Second those in power had the very unpleasant habit of exhibiting their displeasure by cutting off the noses lips or ears of those who happened to be disliked by them on the one hand and on the other they made the same procedure the form of punishment for minor offenses The natural result was that those who had been thus relieved of their appendages desired to be rehabilitated and certain surgeons turned their attention to this form of surgery

The operation of restoration of the nose was an old one but had been practically forgotten after Celsus It was resuscitated by reinvention by a family of Catanea known as Branca who were lavishly me At first they used the skin of the forehead or cheek and later that of the arm The method was mentioned and used to some extent by Benedetti of Legnago who was a professor at Padua and an army surgeon and who died in 1525 The main successful method came through the family of Vianeo of Tropaea in Calabria There were four members of this family all of whom restored noses lips and ears Vincenzo his nephew Bernardino and his sons Paolo and Pietro From this family Caspar Tagliacozzi of Bologna learned the procedure amplified it and finally described it two years before his death

Tagliacozzi or Taliacotius was born in 1546 and died in 1599 He was a professor in the University at Bologna and chief surgeon to the Great Duke of Tuscany to whom he dedicates his book which he entitles *De Curtorum Chirurgia per Insitionem* The volume was published and printed by Gaspar Bindoni at Venice in March 1597 and constitutes the first complete record of the practice of plastic surgery of the time It is beautifully illustrated with wood cuts by Francesco Capello of Modena who as a church decorator as well as a book illustrator Taliacotius reputation as a plastic surgeon following the publication of his work spread to other parts of Europe for we find him mentioned though not accurately in Hudibras where in the first canto of Part I Butler says

> So learned Taliacotius from
> The brawny part of Porters Bum
> Cut supplemental Noses which
> Would last as long as Parent Breech
> But when the Date of Nock was out
> Off dropt the sympathetick Snout

The volume is divided into two main parts the first entitled the Theory of the Art of Plastic Surgery and the second the Practice of the art In the first part the author discusses the conformation of the nose with reference to the rest of the face and its physiology as to respiration smell and influence on the voice He discusses the controversy between Galen and Vesalius as to the function of the foramina in the base of the skull Whether or not they are canals to carry the secretion of the brain into the nose and appears to believe with Galenth that they are

The second portion describes and illustrates instruments and operative procedures and the complications of the latter such as hæmorrhage and gangrene For the restoration of nose and lip the author uses a flap cut from the anterior surface of the arm and the arm and head are held together by an ingenious apparatus which binds them firmly and holds them in position during the process of healing

It is somewhat surprising that the author did not use a sliding flap method for either nose or lip for he knew of the method as he employs it for restoration of the ear taking a flap from the parieto-occipital region for forming a new upper part and *one* from the upper triangle of the neck for restoration of the lobe

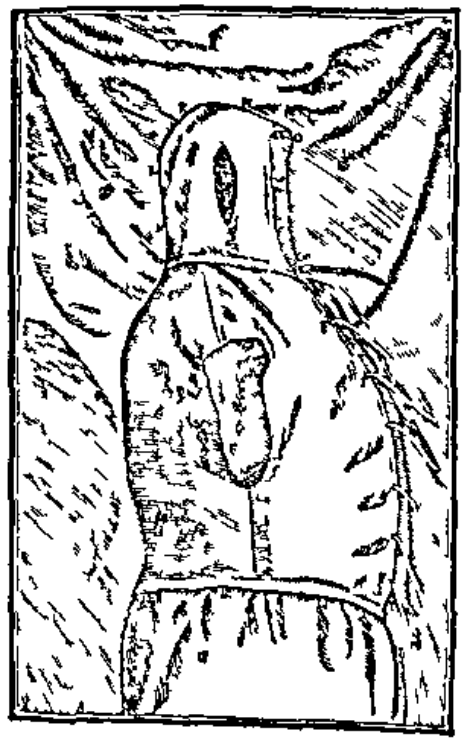
Following the excellent illustrations is a very complete index

Icon Q. n.



CHIRVRG. CVRT

Ico Sextus



CHIRVRG. CVRT

I Non



CHIRVRG. CVRT

I Decim



REVIEWS OF NEW BOOKS IN SURGERY

THE reviewer has repeatedly stated his belief in the fact that in making a diagnosis too much attention is given to ultrascientific laboratory tests and too little to procuring a correct clinical history from the patient Many medical students enter the practice of medicine with the belief that if they have a well equipped laboratory with the information they have been given regarding laboratory tests the making of a diagnosis is a simple formula This is a serious error and the error must be laid on the doorstep of the clinician and not the laboratory worker The laboratory research worker deserves more than the honor which he receives not only for the advancement of the frontiers of medicine but for the instruction of medical students The average clinician is prone to elicit hastily a brief history from his patient subject him to the accepted laboratory test and then render the verdict The interpretation of symptoms is an art which requires much time to perfect and only by constant effort and industry is this possible Due consideration must be given to the intellect of the patient since many who are not conversant with the language used or with the medical vocabulary will in order not to display ignorance give an entirely erroneous history

The recent volume *The Surgical Dyspepsias* by Walton is a striking example of the art of correct history taking with the proper interpretation of symptoms Incredibly in no one volume known to the reviewer is there to be found more valuable information relative to the diagnosis and analysis of symptom One has but to read the classic description of the symptoms of gastric ulcer to realize the importance attached to digesting the detail of the clinical history with discriminating judgment in arriving at correct diagnosis The author has filled well this plan through the entire text and in every instance there are given not only the symptoms of a condition but the essential surgical anatomy etiology pathology and treatment Often much interesting data in technology and pathology is given the author frequently going beyond his American colleagues Such treatment of the various conditions causing dyspeptic symptoms is given as in the author personal high points the best results Consideration is devoted to surgical technique pertaining to operations on the stomach duodenum and the gallbladder The chapters on the diseases of the pancreas deserve outstanding comment Here again the author displays his prodigious knowledge and familiarity with dyspeptic symptoms and their causative pathology

The review is appreciation of real interest in the work shows pedagogy for this literature review

[illegible] London [illegible] Lewis

IT is indeed a great pleasure afforded the reviewer to have placed before him the first four volumes of Bickham's new system[2] A review of such a work is impossible as it would require many pages to review adequately any one of the subjects as covered by the author This master surgeon and scholar has apparently spent many years in compiling this tremendous amount of information from his vast fund of knowledge gleaned from a lifetime of study and experience and is offering it to the medical profession as his final effort to place American surgery on the pinnacle of science There are before the profession a number of volumes and systems of operative surgery with the majority of which the reviewer is familiar but this work bids fair to far exceed all previous works on this subject The thoroughness with which the author presents his subjects the clarity of description the profusion of excellent illustrations all make toward a perfect masterpiece of surgical literature It is interesting to note that save for the artists no other collaborator has contributed any constructive or other form of aid or suggestion in the production of the present volumes The author states in the preface that the 6300 illustrations required the services of forty six artists working 2 80 hours the work continuing over a period of approximately four years This gives a fairly concrete idea of the magnitude of the author's endeavor and achievement

Following a most thorough description of the operative preparation of patients anæsthesia the proper conduction of operations and after treatment the author begins the subject of operative technique Volume I describes the technique of skin grafting dermoplastics transplantations amputation disarticulations artificial limbs and excision of joints Volume II describes the operations on arteries veins lymphatics nerves bones joints muscles tendons ligaments cartilage bursæ fascia skull and brain and spine and cord In Volume III are depicted the operations on the eye ear nose sinuses cheeks lips teeth palate tongue pharynx larynx trachea œsophagus thyroid thymus neck breast thorax pleura lung and mediastinum Volume IV is devoted to operations on the pericardium heart other endothoracic operations abdominopelvic wall hernia peritoneum omentum mesentery stomach pancreas spleen liver bile tracts general intestinal and appendicocæcal tract In every instance the field is unusually well covered never leaving the reader in doubt as to what the exact steps of the operation are Careful consideration is given to the surgical anatomy of each region in which the operation is described thus facilitating a clearer understanding of the technique This latter is especially

[illegible] P. Warren [illegible] Medicine [illegible] London [illegible] W. B. Saunders Company [illegible]

valuable to the student or those not so familiar with *operative surgery*

It is the candid opinion of the reviewer that this is by far the most comprehensive and complete work of its kind before the medical profession today and that no surgeon's library is complete without it

DISORDERS of the knee joint[1] have caused the practitioner of medicine no end of worry The sudden and mysterious onset of annoying and disabling symptoms the accompanying more or less conspicuous change in the joint the inability of the physician to correct the disability and the reported cures by bonesetters all these facts have confronted the profession during times past Only in the past decade or possibly a while longer ago has sufficient study been given this important subject to establish a definite group of symptoms as associated with a definite pathological process Today the X ray is an indispensable aid in the diagnosis of injuries to bones and joints yet there is no doubt that in many instances an injury to the knee joint has been called trivial simply because there has been found no evidence of injury by X ray examination The observers failed to consider the peculiar anatomy of the knee joint and the fact that certain most important structures were not opaque to the roentgen rays and consequently unobserved in the casual examination

The study of the semilunar cartilages and their displacements was a great step in the right way A fairly definite symptomatology has been given us for the diagnosis of these displacements and the treatment put upon a scientific basis Nevertheless a very large percentage of the profession are totally ignorant regarding this condition This fact will explain why in the past and even at present so many of these unfortunate patients find their way to the bonesetters

A most excellent study of these conditions involving the knee joint is offered us by Fisher in his recent monograph A greater part of the text is devoted to the semilunar cartilages but ample consideration is given to loose bodies in the joint arthritis and rupture of the ligaments The reviewer considers this an invaluable addition to the sum total of medical information This work is suitable for the general practitioner as well as for the surgeon in fact the general practitioner will derive the greater benefit since the greater number of such cases find their way into his hands All the deductions in this monograph are endorsed by the reviewer

THE International Medical Annual for 1924[2] is before the reviewer and this edition which is the forty second in every way comes up to previous standards This year an attempt is made to treat certain subjects at greater length in order to strike a balance of contents with previous editions To separate the wheat from the chaff is indeed an irksome task and the editors and contributors are to be congratulated upon their success for consummating the task For those who are unfamiliar with this *Annual* it may be stated that the purpose is to collect and arrange the information we give in an assimilable form so that each member of the profession may not only be furnished with precise and practical data but also may be able to gather a general impression of the direction in which the science and art of medicine is moving Also in noticing contributions we are guided by their practical usefulness to the general medical practitioner

The greater number of the contributors are English this being an English publication The topics are all arranged in alphabetical order thus simplifying the matter of finding the subject one's desire of looking up Many subjects are unusually well covered and many illustrations a number in colors exemplify the text It is time well spent for all practitioners of medicine to survey this work as it contains the essentials of progress of modern medicine in all its branches

THERE is no doubt that we are living in the age of progression The wants of the public be they real or imaginary are being supplied in every way many times to the detriment of the recipient In the medical world the surgeon is approached by the elderly man who wants renewed vigor by means of some mysterious operation which will bring back all the fire and force of youth The elderly woman seeks out the surgeon to return to her the one great attribute of womanhood—youthful appearance and perhaps beauty Attempts are made at both Each can be commended if for no other reason than to satisfy the vanity of the surgeon that his skill is equal to the task On more careful analysis this subject carries more weight than would appear on the surface If it is within the domain of the surgeon's ability to restore if only in part vigor to the declining man then it should become his duty to do it Likewise if the surgeon can restore to the drooping elderly woman a certain degree of youthful appearance it would be folly to deny her this In each case a degree of comfort is given to the individual which in many instances not only makes life worth living in the particular case but may supply an actual economic necessity

It is thus that the reviewer has read with considerable interest and discrimination the recent volume by Miller on cosmetic surgery[3] The author describes a number of operations to correct various facial folds bags and wrinkles He also devotes limited space to plastic operations on the nose and ea

J A WOLFER

[1] Injuries and Diseases of the Knee Joint Including Displacements of the Semilunar Cartilages By Walter M Fisher M D F A C S (Eng) New York The Macmillan Company

[2] The International Medical Annual A Year Book of Treatment and Practitioner's Index Forty second year 924 New York William Wood and Company

[3] Cosmetic Surgery Including Imperfections By Charles Conrad Miller M D Philadelphia F A Davis Company 924

CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

ALBERT J OCHSNER Chicago *President* CHARLES H MAYO Rochester *President Elect*
FRANKLIN H MARTIN Chicago *Director General*

FOURTEENTH ANNUAL SESSION NEW YORK-BROOKLYN OCTOBER 20–24 1924
HEADQUARTERS—THE WALDORF-ASTORIA

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JOSEPH TENOPYR

PROGRAM FOR EVENING MEETINGS

Presidential Meeting Monday October 20—Ballroom Waldorf Astoria 8 P M

Address of Welcome EUGENE H POOL M D Chairman of New York Committee on Arrangements

Address of Retiring President ALBERT J OCHSNER M D Chicago

Introduction of Foreign Guests

Inaugural Address CHARLES H MAYO M D Rochester Minnesota

The Doctor John B Murphy Oration in Surgery—The Treatment of Spastic Paralysis and Its Experimental Basis N D ROYLE M B Sydney Australia *The Significance of the Work* JOHN I HUNTER M D Ch M Sydney Australia

Tuesday October 21 Ballroom Waldorf Astoria 8 P M

Symposium Stomach Surgery

ALBERT JAMES WALTON M S F R C S London Treatment of Ulcers of the Body of the Stomach

H B DEVINE M D Melbourne Australia Supreme Difficulties in Gastric Surgery

CARRICK ROBERTSON M D Auckland New Zealand Septicæmia—Intravenous Injections

HARVEY CUSHING M D *Boston and* LOYAL E DAVIS M D *Chicago Experiences with Blood Replacement during and after Major Intracranial Operations*

Wednesday October 22 Academy of Music Brooklyn 8 P M

Address of Welcome JOHN E JENNINGS M D Chairman of Brooklyn Committee on Arrangements

WILLIAM D HAGGARD M D Nashville Tennessee Debatable Points in Surgery of the Gall Tract

Symposium on Spastic Paralysis

ALFRED W ADSON M D Rochester Minnesota A Discussion of the Surgical Indications and the Postoperative Results Following Section of the Sympathetic Rami for Spastic Paralysis

GEORGE P MULLER M D Philadelphia Subject to be announced

ALLEN B KANAVEL M D Chicago Experimental and Clinical Experiences with Sympathectomy for Spastic Paralysis

N D ROYLE M B and JOHN I HUNTER M D Ch M Sydney Australia Formal Discussion

Thursday October 23 Ballroom Waldorf Astoria 8 P M

CHARLES H FRAZIER M D Philadelphia Sympathectomy for Pain Following Resection of Sensory Root for Trigeminal Neuralgia

BERTRAM M BERNHEIM M D Baltimore Periarterial Sympathectomy Indications for Its Use in Circulatory Diseases of the Extremities

THE CLINICAL CONGRESS IN NEW YORK AND BROOKLYN

PROGRAM IN BRIEF

Monday October 20

10–12 30 Hospital Conference Ballroom Waldorf Astoria Papers and discussion

2 5 Hospital Conference Ballroom Waldorf Astoria Round table conference

8 Presidential Meeting Ballroom Waldorf Astoria Inaugural address of President Elect and the Murphy Oration in Surgery

Tuesday October 21

9–12 Clinics and demonstrations at the hospitals and medical schools

9 30–12 Hospital Conference Ballroom Waldorf Astoria Papers and discussion

2 4 Clinics and demonstrations at the hospitals and medical schools

2 5 Hospital Conference Ballroom Waldorf Astoria Round table conference

8 Scientific session Ballroom Waldorf Astoria Section on general surgery etc papers and discussion

Scientific session Empire Room Waldorf Astoria Section on surgery of the chest Joint session with papers and discussion

Wednesday October 22

9–12 Clinics and demonstrations at the hospitals and medical schools

2 5 Clinics and demonstrations at the hospitals and medical schools

4 Symposium The Cancer Problem Ballroom Waldorf Astoria

8 Scientific session Academy of Music Brooklyn Section on general surgery papers and discussion

Thursday October 23

9–1 Clinics and demonstrations at the hospitals and medical schools

4 Clinics and demonstrations at the hospitals and medical schools

2 Annual meeting of the Fellows of the American College of Surgeons followed by meeting of the Board of Governors Ballroom Waldorf Astoria Reports of Standing Committees

8 Scientific session Ballroom Waldorf Astoria Section on general surgery papers and discussion

Scientific session Empire Room Waldorf Astoria Section on ophthalmology papers and discussion

Friday October 24

9– Clinics and demonstrations at the hospitals and medical schools

2–5 Clinics and demonstrations at the hospitals and medical schools

8 Twelfth Convocation of the American College of Surgeons Ballroom Waldorf Astoria

ON Monday October 20th the fourteenth annual Clinical Congress of the American College of Surgeons convenes in New York and Brooklyn In the following pages will be found the preliminary clinical program and complete programs for the evening sessions and the hospital conference comprising the full program for the five day session

The surgeons of New York and Brooklyn under the leadership of representative committees are preparing a program of clinics and demonstrations that will it is expected surpass all previous efforts The clinical program as here published is to be revised and amplified during the weeks preceding the meeting so that the final program will completely represent the clinical activities of greater New York in all departments of surgery The real clinical program is to be issued daily during the session It will be posted on bulletin board each afternoon for the following day and presented in printed form each morning giving in complete detail a description of the clinics and demonstrations to be given at the several hospitals and medical school

Clinical demonstrations or dry clinics in which surgeons internists pathologists roentgenologists and other specialists will participate will form an important feature of the program Surgical subjects of present-day interest are to be discussed from various angles bringing to bear the best thought on such subjects as developed in the several departments in medicine

Of interest to those specializing in surgery of the eye ear nose and throat is a series of clinical demonstrations to be given each morning at the New York Eye and Ear Infirmary Manhattan Eye Ear and Throat Hospital Bellevue Hospital and other institutions to provide the visiting surgeons who are particularly interested in those departments of surgery with a full program for each day of the session

The Executive Committee of the Congress has prepared programs of unusual interest for scientific meetings on five evenings which with the exception of the Wednesday evening meeting will be held at the Waldorf Astoria hotel On Wednesday evening the meeting will be held in the Academy of Music in Brooklyn Two special meetings on Tuesday and Thursday evening will be held in the Empire Room of the Waldorf Astoria when the papers and discussions will deal with subjects of special importance to those interested in the surgical aspects of oph

thalmology otology rhinology and laryngology

General headquarters for the Congress will be established at the Waldorf Astoria at Thirty fourth Street and Fifth Avenue where practically the entire first floor of the hotel has been reserved for the exclusive use of the Clinical Congress—the Ballroom Visitors Gallery Green Myrtle and East Rooms and other large rooms and foyers adjacent thereto These rooms provide ample space for the evening meetings business sessions registration and ticket bureaus bulletin rooms etc Headquarters will be open for registration at 8 a m Monday October 6th and each morning thereafter at the same hour

The clinical program for Tuesday will be bulletined during Monday afternoon and reservations for tickets for Tuesday's clinics may be filed that afternoon

HOSPITAL CONFERENCE

The annual hospital conference will be held Monday and Tuesday both morning and afternoon in the Ballroom of the Waldorf Astoria It will be noted that the program for this conference which is published in the following pages deals intimately with the details of hospital standardization and management Addresses demonstrations round table conferences and general discussions by hospital superintendents trustees surgeons nurses and others interested in the conduct of hospitals furnish a program of very great interest and practical value offering solutions for many of the everyday problems and difficulties encountered in hospital management and the care of the patient within the hospital

At the opening session Monday morning Dr Franklin H Martin Director General will make the annual announcement of the hospitals which appear on the approved list for 1924

Headquarters for the hospital standardization department and the hospital service bureau of the College together with the office of Dr M T MacEachern Associate Director will be established in the Green Room on the first floor adjacent to general headquarters All those who are particularly interested in hospital problems are requested to register at hospital standardization headquarters upon arrival in New York Such headquarters will be open daily during the entire session

REDUCED RAILWAY FARES

The railways of the United States and Canada have authorized reduced fares on account of the New York Brooklyn session of the Clinical Congress so that the total fare for the round trip will be one and one half the ordinary first-class one-way fare To take advantage of the reduced rates it is necessary to pay full one-way fare to New York procuring from the ticket agent a convention certificate when purchasing the ticket which certificate is to be deposited with the general manager of the Congress at headquarters for the visé of the special agent of the railway companies. Upon presentation of the visé certificate to the ticket agent in New York not later than October 8th a ticket for the return journey by the same route as traveled to New York may be purchased at one half the regular one way fare.

Under this arrangement tickets may be purchased in the eastern central and southern states and eastern provinces of Canada between October 16th and 22nd in southwestern and certain western states between October 15th and 21st and in the far western states and western provinces of Canada between October 14th and 20th. The return journey from New York must be begun not later than October 28th

The reduction in fares does not apply to Pullman fares nor to excess fares charged for passage on certain trains Local railroad ticket agents will supply detailed information with regard to rates routes etc Stopovers on both the going and return journeys may be had within certain limits.

Full fare must be paid from starting point to New York and it is essential that a convention certificate be obtained from the agent from whom the ticket is purchased These certificates will be signed by the general manager of the Clinical Congress and visé by a special agent of the railroads in New York during the meeting No reduction in railroad fares can be secured except in compliance with the regulations outlined and within the dates specified It is important to note that the return trip must be made by the same route as used to New York and that the certificate must be presented and return ticket purchased not later than October 8th

LIMITED ATTENDANCE—ADVANCE REGISTRATION

The rule limiting attendance to a number that can be comfortably accommodated at the clinics must necessarily be strictly enforced at this year's meeting The limit of attendance is based upon a survey of the amphitheaters lecture rooms and laboratories in the hospital and medical schools as to their capacity for accommodating visitors This plan necessitates registration in advance on the part of all who wish to attend When the limit of attendance has been reached through advance registration no further applications will be accepted

Attendance at clinics and demonstrations is

controlled by means of special tickets which plan has proved an efficient means of providing for the distribution of the visiting surgeons among the several clinics and insures against overcrowding as the number of tickets issued for any clinic is limited to the capacity of the room in which that clinic is given

REGISTRATION FEE

In order that no financial burden may be imposed upon the members of the profession in the city entertaining the Congress a registration fee of $5 00 is required of each surgeon attending the clinical meeting such fees providing the fund with which to meet the expenses of conducting the meeting A formal receipt for the registration fee is issued to each surgeon registering in advance which receipt is to be exchanged for a general admission card upon his registration at headquarters This card which is non transferable must be presented to secure clinic tickets and for admission to the evening meeting

NEW YORK HOTELS AND THEIR RATES

	Minimum Rate for Room with Bath	
	Single	*Double*
Astor Broadway and 44th St	$ 00	$8 00
Belmont Park Ave and 42nd St	6 00	8 00
Biltmore Madison Ave and 43rd St	8 00	12 00
Breslin Broadway and 29th St	3 50	6 00
Claridge Broadway and 44th St	3 50	6 00
Collingwood 45 West 35th St	3 50	5 00
Commodore Lexington Ave and 42nd St	5 00	8 00
Gotham Fifth Ave and 55th St	5 00	6 00
Georgian 42 West 35th St	4 50	6 00
Herald Square 16 West 34th St	3 00	5 00
Imperial Broadway and 32nd St	3 00	5 50
Martinique Broadway and 32nd St	3 50	5 00
McAlpin Broadway and 34th St	4 00	6 00
Murray Hill Park Ave and 41st St	4 00	6 00
Park Avenue Park Ave and 32nd St	4 00	5 00
Pennsylvania 7th Ave and 32nd St	4 50	7 00
Plaza Fifth Ave and 59th St	6 00	8 00
Prince George 14 East 28th St	3 00	4 00
Savoy Fifth Ave and 59th St	5 00	7 00
Vanderbilt Park Ave and 34th St	4 00	8 00
Waldorf Astoria Fifth Ave and 34th St	6 00	8 00
Wellington 4 West 55th St	3 50	5 00
Woodstock 127 West 43d St	3 50	6 00

HOSPITAL CONFERENCE PROGRAM

BALLROOM WALDORF ASTORIA HOTEL

Morning Session Monday October 6 10 to 1 30

A J OCHSNER M D Chicago President Presiding

Opening Address of the President

Presentation of the Official Report of Hospital Standardization for the Year 1924 FRANKLIN H MARTIN M D Chicago Director General American College of Surgeons

Analysis of the Hospital Standardization Movement During the Past Seven Years MALCOLM T MACEACHERN M D Chicago Associate Director American College of Surgeons Director of Hospital Activities

Guiding Fundamental Principles of Hospital Standardization REV C B MOLLINIER S J Milwaukee President Catholic Hospital Association

The University Hospital of Dunedin PROF SIR H LINDO FERGUSON C M G M D F R C S I Dunedin New Zealand Dean of the Faculty of Medicine University of Otago New Zealand

What the New Zealand Division of the British Medical Association Is Doing toward Improving Hospital Efficiency for the Practitioners of Medicine J S ELLIOTT M D Wellington New Zealand Chairman New Zealand Council British Medical Association

Essentials for the Development and Maintenance of Efficient Hospital Service in Internal Medicine HARLOW BROOKS M D New York Professor of Medicine University and Bellevue Hospital Medical College President American College of Physicians

A Case Record System as a Basis for Appraising Surgical Work (illustrated) C B KEENAN M D Montreal Quebec Lecturer on Surgery McGill University Faculty of Medicine Assistant Surgeon Royal Victoria Hospital

The Hospital and the Doctor as Co-operating Factors in Diagnosis ALLAN CRAIG M D Chicago Associate Director American College of Surgeons Director of State and Provincial Activities

General Discussion

Afternoon Session 2 00 to 5 00

The Legal Responsibilities of a Hospital JUDGE HAROLD M STEPHENS Salt Lake City Utah

Errors in Surgical Diagnosis Avoidable and Unavoidable—as Seen by the Laboratory Man (illustrated) ARTHUR A EISENBERG M D Cleveland Ohio Director of Laboratories St John's Hospital

The History of the Staff Conference CHARLES A GORDON M D Brooklyn Clinical Professor of Obstetrics and Gynecology Long Island College Hospital

The Essentials of a Staff Conference Staffs of St Catherine's and Greenpoint Hospitals Brooklyn

Standardizing Staff Conference Procedure ROBERT L DICKINSON M D New York Clinical Professor of Gynecology Long Island College Hospital

General Discussion

Morning Session Tuesday October 21 9 30 to 1 30

CHARLES MAYO M D Rochester Minnesota Presiding

The Relation of the Hospital to the Departments of Radiology and Pathology GEORGE S MCREYNOLDS M D Temple Texas Oculist and Aurist Kings Daughters Hospital

Appraising of Case Records JOHN A WESTER M D Chicago Assistant Professor of Surgery Northwestern University Medical School Adjunct Surgeon Wesley Memorial Hospital W C DANFORTH M D Evanston Illinois Associate Professor of Gynecology Northwestern University Medical School Attending Gynecologist and Obstetrician Evanston Hospitals

Essentials for an Efficient Surgical Service in a Hospital CARL A HAMANN M D Cleveland Professor of Applied Anatomy and Clinical Surgery Western Reserve University School of Medicine Visiting Surgeon St Vincent's Charity and Cleveland City Hospitals

Essential Features for the Organization and Operation of Special Clinical Departments in Hospitals.

a Ophthalmology and Oto Laryngology GEORGE E SHAMBAUGH M D Chicago Professor of Oto Laryngology Rush Medical College Oto Laryngologist Presbyterian Hospital

b Obstetrics HERBERT M LITTLE M D Montreal Quebec Assistant Professor of Obstetrics McGill University Faculty of Medicine Obstetrician Montreal Maternity Hospital

c Genito Urinary HENRY J SPELL SCHERCK M D St Louis Missouri Assistant Professor of Genito-Urinary Surgery St Louis University School of Medicine Visiting Genito Urinary Surgeon St Louis City Hospital and Genito Urinary Surgeon Missouri Pacific Hospital

d Orthopedics A MACKENZIE FORBES M D Montreal Quebec Clinical Professor of Orthopedic Surgery McGill University Faculty of Medicine Surgeon in Charge Children's Memorial Hospital Consulting Surgeon Montreal General Hospital

Equipment Organization and Management of a Physiotherapy Department in a Hospital ROBERT E FRICK M D New Haven Connecticut Director of Physiotherapeutics Grace Hospital

The Clinical Value of Physiotherapy in a Hospital (illustrated) HARRY E MOCK M D Chicago Assistant Professor of Industrial Medicine Rush Medical College Member of Surgical Staff St Luke's Hospital

General Discussion

Afternoon Session 2 00 to 5 00

Fundamental Principles of Hospital Administration from an International Viewpoint F S GILMORE Chicago Superintendent Wesley Memorial Hospital President American Hospital Association

Financing Clinical Pathology in the Modern Hospital WARD T BURDICK M D Denver Colorado Secretary American Society of Clinical Pathologists

Hospital Administration in New Zealand ALFD R FALCONER C B E M B Ch B Dunedin New Zealand Medical Superintendent Dunedin Hospital

Round Table Conference conducted by CARL I BLACK M D Jacksonville Illinois Surgeon Passavant Memorial and Our Saviour's Hospitals Topics for discussion (1) Reception and Discharge of Patients in Hospitals (2) Increasing Consultations (3) Central Operating Room Records (4) Wound Results in Operative Cases (5) Standardizing of Operating Room Technique (6) The Internist and Hospital Standardization (7) The Autopsy and Hospital Efficiency (8) Selection of Medical Staff of a Hospital (9) Essentials for Filing Case Records (10) Follow up and Study of End Results

General Discussion

GENERAL SURGERY, GYNECOLOGY OBSTETRICS ORTHOPEDICS, UROLOGY

CLINICS IN NEW YORK HOSPITALS

ST VINCENT'S HOSPITAL

Tuesday

SIMON J WALSH WILLIAM FORD JOSEPH BRADY GEORGE R STUART and C J MACGUIRL JR—9 General surgical clinic

GEORGE DAVID STEWART ARTHUR M WRIGHT ERNEST FAHNESTOCK RAYMOND P SULLIVAN and EDWARD A KING— Surgery of the chest Demonstration of hoist ir cord system

Wednesday

JOHN ASPELL WALLACE KRUGLER JOHN MCGRATH JAMES P HENNESSEY AUGUST JAMES RAGGI—9 Uterine displacements

RAYMOND P SULLIVAN—9 Management of cases of hyperthyroid m

Thursday

GEORGE DAVID STEWART ARTHUR M WRIGHT ERNEST FAHNESTOCK RAYMOND P SULLIVAN and EDWARD A KING—9 Abdominal surgery Goitre ca

EDWARD L KEYES—2 Urological surgery

REGINALD H SAYRE and WILLIAM D RAN— Orthopedic clinic

ROOSEVELT HOSPITAL

Tuesday

CHARLES H PECK and staff—9 Surgical clinic

HOWARD C TAYLOR and staff—9 Gynecological clinic

G P PEASE OVER and C W LESTER— Surgical laboratory demonstration

J M STEINER— X ray diagnosis

Wednesday

JAMES I RUSSELL and staff—9 Surgical

WM CRAWFORD WHITE— Surgical laboratory demonstration

J M STEINER— X ray diagnosis

Thursday

CHARLES H PECK and staff—9 Surgical

HOWARD C TAYLOR and staff—9 Gynecological clinic

E F KILBANE— Demonstration in surgical clinic

Friday

JAMES I RUSSELL and staff—9 Surgical clinic

E F KILBANE—12 Demonstration in urological clinic

ST BARTHOLOMEW'S HOSPITAL

Tuesday

J M LYNCH—8 3 General surgical clinic

Wednesday

AUSTIN FLINT—8 3 Gynecological

A CRUMP— Medical surgical cases

Thursday

J M LYNCH—9 General gynecological clinic

L L KELLOGG—2 General surgical

MEMORIAL HOSPITAL

Tuesday

WILLIAM S STONE—9 Cases of lymphosarcoma Hodgkin's disease leukaemia

A L DEAN JR—9 Genito-urinary cases

F H JOHNSON—9 Mouth and tongue cases

WILLIAM P HEALY—10 Gynecological cases

F E ADAIR— Breast cases

N GREEN— Stomach cases

JAMES EWING—11 Lecture General survey of cancer problems

W B COLEY— Sarcoma of the long bones

R F HERRENDEEN—12 Results of X ray therapy

WILLIAM S STONE— Lecture Diagnostic aspects of the cancer problem

DOUGLAS QUICK—3 Mouth and tongue cases

C D PALLEN—3 Gynecological case

DR BRICKLEY—3 Rectal cases

L F CRAVER—4 Cases of lymphosarcoma Hodgkin's disease and leukæmia

B F BARRINGER—4 Genito-urinary cases

BURTON J LEE—Breast cases

Wednesday

W B COLEY—9 Sarcoma of the long bones

B I BARRINGER—9 Genito-urinary cases

DOUGLAS QUICK—9 Mouth and tongue cases

DOUGLAS QUICK— Lecture Present status of radiation therapy

BURTON J LEE— Lecture Present status of surgical treatment of carcinoma

WILLIAM P HEALY— Gynecological clinic

W B COLEY— Sarcoma of the long bone

WILLIAM S STONE—2 Cases of lymphosarcoma Hodgkin's disease and leukæmia

DR BAILEY— Gynecological cases

BURTON J LEE— Breast cases

D FAILLA—3 Lecture The physics of radiation therapy

Thursday

WILLIAM S STONE— Weekly clinical conference

FORDHAM HOSPITAL

Tuesday

F FLYNN and staff—9 General surgery

A H HARRIGAN and staff—2 General surgery

Wednesday

J H KENYON and staff—9 General surgery

E R CUNNIFFE and staff—2 General urgery

J H TELFAIR and staff— Obstetrical clinic

Thursday

ALEXANDER NICOLL and staff—2 General surgery

Friday

S W BOORSTEIN and staff—9 Orthopedic clinic

R E WALSH and staff—2 General urgery

NEW YORK HOSPITAL

Tuesday

C L Gibson—Operations and demonstration of cases. Acute perforations of stomach and duodenum. Report of six cases of perforating carcinoma of stomach. Case of carcinoma of descending colon five years after operation. End results of chronic appendicitis

Willard Parker—Operations and demonstration of cases. Tumors of the colon. High rectal stricture. Ileus

Wednesday

Frank H Potter—Thyroidectomy operations and demonstrations of cases. Plastic surgery. Follow-up study of goiter patients after operation

J M Hitzrot—Fractures of clinic. Operations and demonstrations of cases

Thursday

C L Gibson—Operations and demonstration of cases. Diagnosis. Hand and results of operative treatment. Pneumoperitoneum. Exhibition of two cases. Exophthalmic goiter patients after and recent myxedema

F W Bancroft—Operations. Osteomyelitis. Therapeutic consideration of injuries. Fractures and osteomyelitis. Follow-up study

J V Weeks—Exhibition

Friday

Lucius H Pitkin—Clinic surgery operations and demonstrations of cases

P A Dexter—Discussion. Follow-up

B J Lee—Bronchoscopic operations. Demonstration of cases illustrating ghost. Breast lesions. Follow-up cases

James Buchanan Brady Foundation

Tuesday

Dr Emerson—Administration of sacral and parasacral anesthesia for prostatectomy

Oswald S Lowsley—Prostatectomy on above case

Roy B Henley—Cases of deformities. Specific results of operation

W S Pitts—Administration of paravertebral anesthesia for kidney operation

Oswald S Lowsley—Prostatectomy on above case

Staff—Ward rounds showing special attention to patients and apparatus. Visits to the James Buchanan Brady Foundation for Urological Research Hospital

Wednesday

Max Lapidus—Demonstration by artist of Department of Urology

I M Butterfield and Dr Craig—Demonstration of cases from the Children's Urological Clinic

T K Kirwin—The history of urology. Instruments in use at Brady Urological Institute

Cystic Clinic—Pyelograms showing stricture of ureter

F C Steinmetz—Pyelograms showing malignancy of the urinary tract

Frederick T Lee—Stones in urinary tract

Emil J Kopp—Pyelitis

Miguel Alvarez—Hydronephrosis. Interesting pyelograms.

Tilton B Watson—Demonstration of case of hypospadias cured by operation

Friday

W S Pitts—Administration of paravertebral anesthesia for kidney operation

Oswald S Lowsley—Nephrotomy. Case of

Vince T Nordiller—Demonstration of case of cancer cured by operation

Dr Emerson—Administration of sacral and parasacral anesthesia for operation upon the prostate

Oswald S Lowsley—Prostatectomy on above case

Oswald S Lowsley and staff—Demonstration of preoperative case and postoperative treatment of urological cases

FIFTH AVENUE HOSPITAL

Tuesday

George W Roberts—General surgical clinic

I K Kaufman—Tuberculosis of genito-urinary tract.

Anson H Bingham—Cases of autogenous bone grafting

William F Hanan—Resection of duodenal ulcer

H S Dunning—Plastic surgery

Wednesday

Walter Gray Crump—Surgery of the gallbladder and biliary tract

Le Roy Loizeaux—Technique of the delivery room

William F Hoke—Resection for gastric ulcer

Thursday

George W Roberts—General surgical clinic.

William L Rodman—Demonstration of hypospadias surgery

Nephrectomy Carleton—Operative pyelitis cases

William H Bishop—Cases of brain surgery

Bristol Patterson—Oral surgical clinic

Henry B Safford—Demonstration of present method

Friday

Walter Gray Crump—Acute generalizing peritonitis

Horace Ayres—Cystoscopic demonstrations

William H Bishop—General surgical clinic

Daily

Theodore Dreyer Buchanan and staff—Demonstrations in anesthesia

D S D Jessup and staff—Conferences on surgical pathology

Lewis Gregory Cole and staff—Every day demonstration

BELLEVUE HOSPITAL

Tuesd y

R S Hooker A V S Lambert J A McCreery and C J MacGuire Jr—9 Operatio s and e hibit on of c ses of fractures tho cic su g ry gastric ulcer and sarcoma of b ne

Frederick W Rice and Harold Bailey—9 Dem n strat on of bstetrical cases

Frederick C Holden Onslow A Gordon Jr and Edwin Holladay—9 Illustrati e gynecol gic l opera t ons with d cussi ns on the methods of p e and post-ope tive c e f the pat t Methods of unde graduate a d po tgradu te teaching

Douglas Symmers—2 Aspects of thra

J Breckstein— Study f duoden l morphology

W J Rendi n— Study of g stric m c sa

I Seth Hirsch—2 Cæcum c lic phincteric t ct

Wed d y

John A Hartwell—9 Op ation on upper abdomen ith demon tration of ncisi n and methods of drainage

Frederick W Rice a d Harold Bailey—9 Demon strat o of ob tetrical ca s

H rold Santee— D mon trati n of s pen i n trac ti a d t tm t of f act res

Jo eph E King—2 Exhib tion of cases of b n ab cess a d other neurosurgical cases

Th ir day

T A Smith Edwin Beer a d staff—9 Late sult of fractures of eck f femur Lat esults of pe forated gastr and duoden l ulc rs

Frederick C Holden Onslow A Gordon Jr a d Edwin Holladay—9 Illust at e gynecol gical peratı ns with d cussi ns o the method f pre a d postoperati e ca of the p t ent M thods of nd rgr d te d postg du t t ching

Carl G Burdick a d staff—2 E d results in fractures n hildren with poor a tomi l educt n Empye ma method of treatme t nd end sult Pl sti rg ry methods d nd sults P rpura hæmor rhagica thr mbocytopenic typ Res lt of splenec t my

F id y

George D Stewart John Douglas A M Wright R P Wadhams W H Barber nd George A Koenig—9 S gical tea h g clinic

Edward Keyes—9 Dem n tr ti f urol gical cas s

Frederick C Holden Onslow A Gordon Jr and Edwin Holladay—9 Illustrati gynec logic l operati ns with discussio on the methods of pre and postop r tiv ca e of th pat ent M thod of under gradu te nd postgrad ate tea hing

BRONX HOSPITAL

Tu sday

Max Rosenthal a d staff— Trachelopl st c opera ti ns hyste ectomy tc

Martin Rehling nd staff—2 30 Op ti s the k d eys and pelvic g n u der l cal and sacral anæsthe a

Th day

A A Berg nd taff—10 G st ent ol g al lin

F idsy

H Grad and taff—4 Gynec log cal cl nic

HOSPITAL FOR JOINT DISEASES

Tuesd y

W M Brickner—8 30 Operations for b ne ab cess a d subacromial bursitis Dem tration of cases of houlder disabil ty

H C Frauenthal—8 30 Op rations Te don trans plantation b f reati n of h p joint Demonstration of cases of Paget s dise se

E H Eising—8 30 Demonstrati n of cases of bone sarc mata

O H Bartine— Showing construction of new 275 bed hosp tal

W edne day

H W Frauenthal—2 Demon tratio of ca es of bone and j int syphilis

H Finkelstein—2 Dem stration of cases of neuro-troph c joints

S A Jahss—2 Demonstration f cases f osteogenesis imperfecta

A L Levy—2 D monstrat n of cases f K hler s disease

H B Philips—2 X ray demo stration of b ne anomalies

O H Bartine—2 Sh wing construct on of new 275 bed h pital

Th d y

H W Frauenthal—8 30 Oper ti ns Iod e i jection for d located s mil r c rt l ge Fraue thal reduc t n of conge ital h p dislocat on

P M Gralsman—8 3 Operation for chr ic steomyeli tis

H Finkelstein—8 30 Ope atio s Te don tr nsplanta t ons fract re non union bo e g aft

H C Frauenthal—8 3 Demon trat on of cases of fract res thro gh joints

W M Brickner—8 30 D m stration of cas s of chronic bone absc ses

F id y

H Finkelstein— Demonstrat o of cases of myos tis sific ns prog ess e

H C Stein—2 Demo tr ti n of cases f ep physeal sep arat n f upper d f femur (Froehl ch s syndr m)

I S Tunick—2 Demo str ti n of ses of thrombo ang tis obl tera s

W I Galland—2 Demonstrat on of cases P ri rthritis of shoulde t jection of quinine and urea hydrochlor ide

I A Stolo f—2 Demon trati n Mobili at on t eat me t of fractures abo t ankle

LEBANON HOSPITAL

Tu sd y

A J Rongy—9 Gynecolog cal clini

G Seeligmann—2 30 Gyne ological cl n c

Ralph Waldo—2 3 Gynecolog cal clinic

W ed e day

Henry Roth—9 30 Su gical cl nic

L Miller Kahn—9 3 S rgical cl c

Thi sday

A J Rongy—9 Gynecological clinic

G Seeligmann—2 3 Gynecological clinic

Ralph Waldo—2 3 Gynecol g cal l n c

F id y

Henry Roth—9 30 Surgical cl nic

L Miller Kahn—9 30 Su gical clinic

PRESBYTERIAN HOSPITAL

Symposium—Surgery of the Gastro-Intestinal Tract

F. B. St. John and John Von Glahn—Hæmorrhage from duodenal ulcer; postmortem studies and discussion of indications for resection of the pylorus

A. O. Whipple and Ross Golden—Indications for radical surgical treatment of ulcer of the lesser curvature; X-ray studies and discussion of indications for radical removal by midgastric resection—Billroth II, Pólya and the Moynihan operation

F. B. St. John and A. O. Whipple—Results in radical surgery of the stomach illustrated by follow-up cases

Ross Golden—Diagnostic points in roentgenology of the stomach and duodenum

George Draper—Studies in the constitutional make-up of patients with ulcer of the stomach and duodenum

A. O. Whipple and F. B. St. John—Operative technique in gastric surgery

Hugh Auchincloss and A. O. Whipple—Follow-up cases illustrating abdominoperineal resection for cancer in the region of the rectum

Symposium—Biliary Tract Disease

Ross Golden—X-ray studies in diseases of the biliary tract

Ross Golden, Louis Bauman and A. O. Whipple—Results with calcium tetrabromphthalein and X-ray studies

A. O. Whipple—Indications for common duct drainage. Follow-up results

Louis Bauman and D. C. Bull—Liver function tests

A. O. Whipple—Factors in long-continued biliary tract surgery

George Draper—Constitutional studies in the diseases of the biliary tract

A. O. Whipple—Follow-up cases illustrating pancreatic lesion

Demonstration

Hugh Auchincloss and Ross Golden—Surgery of the bowel and best follow-up results and discussion of X-ray features

Hugh Auchincloss—Elastic surgery and sclerosing of hand infections. Follow-up results

Louis Bauman—Insulin therapy as applied to surgical cases. Discussion of results with calcium tetrabromphthalein and with liver function tests

J. Bentley Squier—Urological surgery. Follow-up and operative technic

W. B. Larson, Jr.—Diseases of the thyroid

J. M. Hanford—The beneficial results of lymph gland dissection of neck. Cases illustrating follow-up results

F. T. Van Beuren, Jr.—Acute intestinal obstruction. Discussion of treatment together with diagnosis of jejunostomy in relation to ileus

William Darrach—Fracture dislocation

C. A. Elsberg and Dr. Penfield—Discussion of neurological cases from the standpoint of differential diagnosis, experiment and laboratory and treatment

ST. MARY'S HOSPITAL

Tuesday

Staff—9. Malformations and deformities in children. Demonstration of non-operative cases. Specimens

Friday

Staff—9. Gynecological clinic

WOMAN'S HOSPITAL

Tuesday

Hermann Grad and E. A. Bullard—9. Gynecological operation

H. C. Bugbee and staff—9. Urological clinic.

George Gray Ward, Jr. and L. K. Farrar—2. Gynecological operation

Dr. Plaut—2. Pathological laboratory demonstrations

W. H. Glafke—2:30. Gastro-enterological clinic

Wednesday

H. L. B. Pardee—9. Cases in progress complicated with heart disease

F. A. Dorman and L. A. Lyons—2. Demonstration of obstetrical ward and delivery room technique

George Gray Ward, Jr. and L. K. Farrar—Exhibition of radium

W. T. Kennedy—*Radiography of pelvic conditions* (Dr. Peterson's technique)

B. H. Goff—History system of the Woman's Hospital

Dr. Aldridge—Insufflation clinic

Dr. Plaut—Pathological laboratory demonstrations.

F. A. Dorman and L. A. Lyons—3. Demonstration of new follow-up system in obstetrics

Thursday

R. M. Rawls and W. T. Kennedy—9. Gynecological operation

H. G. Bugbee and staff—9. Urological clinic

D. Bissell and B. H. Goff—Gynecological operations.

Dr. Plaut—2. Pathological laboratory demonstrations

R. F. Herfindeen—3. X-ray diagnosis and therapy

Friday

Hermann Grad and E. A. Bullard—9. Gynecological operation

George Gray Ward, Jr. and L. K. Farrar—2. Gynecologic operations

Dr. Plaut—2. Pathological laboratory demonstrations

W. H. Glafke—3:3. Gastro-enterological clinic.

FLOWER HOSPITAL

Tuesday

H. B. Safford—9. Obstetrical clinic

G. W. Lutton—2. *Intestinal surgery*

Wednesday

A. L. Soresi—9. Demonstration in Laboratory of Surgical Research.

W. F. Honan—*Operations on the duodenum and stomach*

Dr. Yoland—Demonstration of unusual cases from the Department of Surgical Pathology

Thursday

F. M. Smith—9. General surgery

A. L. Soresi—General surgery

Friday

J. H. Forbes—9. Gynecological clinic review of the results of the current general abdominal abortion

Sprague Carleton—2. Bladder surgery

O. Rovno Bowitz—2. Rectal surgery

L. M. Powell—2. Demonstration clinical hæmatology

Daily

Demonstrations Anæsthetical and general Laboratory of Surgical Research Departments of Pathology Hæmatology and Roentgenology

LENOX HILL HOSPITAL

Tuesday

GUSTAV SEELIGMANN ARTHUR STEIN and ROBERT L McCREADY—9 Combination of surgery and radium in the treatment of carcinoma of the uterus

H R A GRAESER—2 Cystoscopic clinic

Wednesday

DEWITT STETTEN and JOHN C A GERSTER—9 Cholecystectomy without drainage Inguinal hernia technique

FELIX COHN H A EHRMANN and EDWARD L PRATT—9 Operations and demonstrations of cases

WILLIAM H STEWART and F J RYAN—10 Latest developments in roentgenographic examination of the gall bladder and kidney Some refinements in the roentgenographic diagnosis of skull fractures

CARL EGGERS OTTO C PICKHARDT and HERBERT W MEYER—3 Chest suppuration Resection of œsophagus for carcinoma

Thursday

HERMAN FISCHER PAUL K SAUER and FRANCIS M DEAVER—9 Local anæsthesia in operations on upper abdomen Hæmostasis in postatectomy Plastic for artificial anus

GEORGE L ROHDENBURG F D BULLOCK P J MANHEIMS A BERNHARD and H G JACOBI—2 Demonstration of the Kahn test Salt metabolism in anoplasty development of the microcystic ovary

FRANZ TOREK NELSON K BENTON and G E MUEHLECK—3 Carcinoma of the mouth

Friday

FRANK R OASTLER PERCY H WILLIAMS and ROYAL C VAN ETTEN—9 Use of radium at menopause Use of X ray in treatment of fibroid tumors Fulguration Advantage of proper blood chemistry in treatment of hyperemesis gravidarum Adequacy of technique in dissection in treatment of cystocele and rectocele

C H JAEGER—9 Orthopedic hints

WILLY MEYER—2 Late results after radical operation for cancer of breast Laboratory assistance in the diagnosis of cholecystitis Conservative treatment of gangrene Extremities specially the embonguti obliterans Surgical treatment of advanced pulmonary tuberculosis

HOSPITAL FOR RUPTURED AND CRIPPLED

Today

ROYAL WHITMAN and staff—8 30 Hospital rounds

W B COLEY C J BURDICK and staff—8 30 Operative hernia clinic

ROYAL WHITMAN and staff— Demonstration of the abdominal treatment for fracture of the neck of the femur Isolation operation for tuberculous and for arthritic deformity at the hip

F E ADAIR—2 Demonstration of types of umbilical femoral and inguinal hernia

Wednesday

J P HOGUET and F E ADAIR—9 Operative hernia clinic Demonstration of postoperative cases

Thursday

PERCY ROBERTS and staff—8 30 Instrumentation

ROYAL WHITMAN and staff—2 Demonstration of the operative treatment of structural scoliosis

ST LUKE'S HOSPITAL

Tuesday

WALTON MARTIN WILLIAM A DOWNES W S SCHLEY N W GREEN R W BOLLING H H M LYLE F S MATHEWS JOHN DOUGLAS M K SMITH and E D TRUESDELL—8 30 General surgical clinic

F S MATHEWS and G M GOODWIN—10 Goiter cases

JOHN DOUGLAS—1 Lantern slides demonstrating the diagnosis of subphrenic abscess and collections of fluid below the diaphragm

Wednesday

WALTON MARTIN WILLIAM A DOWNES W S SCHLEY N W GREEN R W BOLLING H H M LYLE F S MATHEWS JOHN DOUGLAS M K SMITH and E D TRUESDELL—8 30 General surgical clinic

M K SMITH—10 Fracture clinic

H H M LYLE—1 30 Disabilities of the hand

H G BUGBEE F E DUBOIS and G F HOCH—11 15 Exhibition of postoperative urological cases Lantern slide talk on urological subjects

Thursday

WALTON MARTIN WILLIAM A DOWNES W S SCHLEY N W GREEN R W BOLLING H H M LYLE F S MATHEWS JOHN DOUGLAS M K SMITH and E D TRUESDELL—8 30 General surgical clinic

F C WOOD—1 30 Clinical results of radiotherapy

F C WOOD— 30 Lecture and demonstration on the X ray plant and methods of measurement of X rays in the radiotherapeutic department

Friday

WALTON MARTIN WILLIAM A DOWNES W S SCHLEY N W GREEN R W BOLLING H H M LYLE F S MATHEWS JOHN DOUGLAS M K SMITH and E D TRUESDELL—8 30 General surgical clinic

T H MYERS and associate —2 Orthopedic clinic

Daily

F C WOOD Demonstration at the Crocker Laboratory, Artificial production of cancer and other phases of research

DR BROWN Radiological demonstration

POLYCLINIC HOSPITAL

Today

K W KEY—9 Neurosurgical cases

L J LADIN—11 Gynecological clinic

J J NUTT and ARMITAGE WHITMAN—2 Orthopedic clinic

Wednesday

J P GRANT—9 General surgical clinic

J R LOSEE and L D GAGER—11 Pathological demonstration

E L KELLOGG and F C KELLER— Gastrointestinal surgery

Thursday

A S MORROW—9 General surgical clinic

A J QUIMBY—1 X ray demonstration

W WARD—2 Gynecological clinic

D A SINCLAIR A R STEVENS R G REESE—2 Urological clinic

Friday

WILLIAM SHARP—9 Neurological cases

C A MCWILLIAMS—11 General surgical clinic

C G CHILD—2 Gynecological clinic

NEW YORK POST-GRADUATE HOSPITAL

Tuesday

JOHN F ERDMANN—8 3 General surgical clinic.
EDWARD W PETERSON— General surgical clinic
W DANNREUTHER—2 Gynecological clinic
CHARLES OGILVY—4 30 Orthopedic clinic
F CARTER—4 30 Demonstration of local anæsthesia

Wednesday

H D FURNISS—9 Gynecological clinic.
L J UNGER—10 Demonstration of blood transfusion
CHARLES GORDON HEYD—2 General surgical clinic
JAMES N WEST—2 Gynecological clinic
CHARLES A ELSBERG—2 30 Neurological clinic.
B W MOFFAT—4 30 Orthopedic clinic

Thursday

FRED H ALBEE—9 Orthopedic clinic
J BENTLEY SQUIER—9 Urological clinic
J J MOORHEAD—2 Traumatic surgery
L P WEIGEL—4 30 Orthopedic clinic

Friday

EDWARD W PETERSON—9 General surgical clinic
S W BANDLER—Gynecological clinic.
JOHN F ERDMANN—2 General surgical clinic
CHARLES OGILVY—4 30 Orthopedic clinic
F CARTER—4 30 Demonstration of local anæsthesia.

MISERICORDIA HOSPITAL

Tuesday

JOSEPH A DEVLIN—9 30 Operations on and demonstration of pelvic tumors
EDWARD I KILBANE—2 30 Demonstration Subperitoneal ureters with effect pelvic openings Symptomatology of urethral and renal calculi

Wednesday

ANTHONY H HARRIGAN—9 3 Gall bladder and stomach cases
ALEXANDER R SCHMITT— Complications of pregnancy and labor management and end results
WILLIAM W MAYER—2 Demonstration by X ray films of atypical cases

Thursday

FRANCES E BUTLER—2 30 Orthopedic clinic. End results of operative treatment in poliomyelitis

Friday

ROBERT C SCHLEUSSNER—3 Clinical findings encountered in the routine laboratory examination of specimens

GOUVERNEUR HOSPITAL

Tuesday

A E SELLENINGS—2 Surgical clinic.

Wednesday

W H W KNIPE— Demonstration of normal and abnormal obstetrical cases
L J LADIN—3 Gynecological clinic

Thursday

A E SELLENINGS—2 Surgical clinic

Friday

E L KELLOGG— Surgical clinic.

SLOANE HOSPITAL FOR WOMEN

Tuesday

R N PIERSON—9 Fibroids as a complication of pregnancy
ROYAL VAN ETTEN—9 Operative treatment of fibroid end results
JAMES CORSCADEN—9 X ray and radium treatment of fibroid end results
W E STUDDIFORD—9 Summary of the treatment of fibroid Demonstration of cases

Wednesday

WILLIAM P ST LAWRENCE—9 Care of the newborn
W W *HERRICK—9 Medical complications in obstetrics*
E E BUNZEL—9 Statistical review of the toxemias of pregnancy

Thursday

WILLIAM JOHNSON—9 Autopsy findings in stillbirth natal and neonatal deaths
W E CALDWELL—9 Prevention of some birth injuries demonstration on the mannikin and by pictures

Friday

WARREN HILDRETH—9 Condition of the pelvic floor following primiparous labors
W E STUDDIFORD—Etiology and demonstration of methods of repair

METROPOLITAN HOSPITAL

Tuesday

J H FOBES and staff—9 Management of pelvic infection in the female Discussion of the results of curettage in aseptic abortion
C B REED and H J FOBES—2.30 Pneumoencephalography *in hydrocephalus*
C L BAGG and RALPH WARD—3 30 Surgical clinic review of extra uterine pregnancy

Wednesday

HENRY SAFFORD—9 *Demonstration of fractures of the* pelvis complicating pregnancy
L S LOIZEAUX—1 The modern cæsarean operation

Thursday

J R LISA—10 Demonstration of microscopical as a complication of pulmonary tuberculosis autopsy specimens
G S HARRINGTON and staff— Compound fractures

Friday

WILLIAM F HONAN and staff—10 Demonstrations and operations under the various forms of local paravertebral spinal and splanchnic anæsthesia. Peripheral sympathectomy
S CARLETON— Urological clinic
WALLACE B HOUSE and A H BINGHAM—3 Transverse myelitis neurological and orthopedic clinic
G F RAYNOR G G ORNSTEIN and M M STEINBACH—4 Surgical interference in pulmonary tuberculosis

BROAD STREET HOSPITAL

WALTER M BRICKNER WALTER G CRUMP J RICHARD KEVIN *ROBERT T MORRIS* WILLIAM SCHROEDER JR and RALPH STEWART—Operative demonstrations and beds and clinics in traumatic and general surgery
MAXIMILIAN STERN—Urological operations and cystoscopic demonstrations

BETH ISRAEL HOSPITAL

T esday

ISADORE SEFF—9 Para ertebral anæsthe a in empyema
CHARLES GOODMAN a d staff—2 General surgical l n c
I MOSCHOWITZ—2 P thology of app d citis
CHARLES GOTTLIEB a d DR TAYLOR—2 Demonstrat n f interest ng roe tgenograms
DR SCAL—3 Radium treatm nt in cancer f tongue g ite and di eas s of t nsils

W d esday

RICHARD LEWISOHN—9 Surg cal tr atment of gastric nd duodenal ulcers
HARRY E ISAACS— Acute hæmo rhagic p ncreat tis
HARRY E ISAACS a d staff— G neral s g cal lin c
RICHARD LEWISOHN and staff— Ge eral su g cal cl c
M KAHN—2 Ins li and nt rvin in surgi al diabete
DR PREISER—2 Flu ro opy of ga t o-intest al tr ct

Th sd

L J LADIN—9 Demonstrat on of arly gns f preg na cy D scu o of extr uteri e p egn ncy
MEYER R ROBINSON—1 Lantern l de demonst at ons f the path l gi al a atomy of tubal pregn ncy
I C RUBIN— D gn t c and the apeuti alue of te e nsufflati
HERMAN LORBER—11 P esent ti of Cas s treated with *rad m*
L J LADIN and taff— G ner l surg al cli

F iday

ABRAHAM L WOLB RST—9 E hibit of w x m dels d m on trat ng pathologi al le ons of the erumontan m nd esical phi ter

INFIRMARY FOR WOMEN AND CHILDREN

T d y

MARIE CHARD—9 Gynecologi l cl nic
HELEN BALDWIN—9 M di al a pect f gical c es
CAROLINE FINLEY— Use f endo n s i ob tetrics
AGNES C VIETOR (Posto)— An t m cal basi fo st dy of isceroptos s

W d esd y

MARIE CHARD a d EMMA ARONSON—9 G eral urg ry
ELISE L ESPERANCE—9 Demonstrati n of gr s d mu oscop c p th l gy
NANCY JENNISON—9 Flu r opy of th ch t after bis muth meals
LEE EDWARD—9 Ob t trical cl nic
AGNES C VIETOR (Bosto)— Anat mi l d m n tra t o with la tern slid

Th d y

ELISE L ESPERANCE—9 X ay dem strati
MARY PUT AM—9 Su g ry in pediatrics
WILHELMINA RAGLAND—9 Th toxæmi of pregna cy
AGNES C VIETOR (B t n)— A atom al b sis for study of isce optosis

F iday

ANNA HUBERT— General u g cal l
GEORGIA REID— D m trati f se f Gw thmey method of a æsth a dun g l bo
AGNES C VIETOR (Boston)— Anatomu al b s for study f n ceropt s

NEW YORK ORTHOPEDIC HOSPITAL

Orth p d c pe ati s by the taff d ly t 8 O t pati nt cli cs da ly t 30

RECONSTRUCTION HOSPITAL

Tu d y

JOSEPH A BLAKE nd assoc ates—9 Demon tration of t eatm nt of fractu es by s p nsion and traction
WILLIAM V HEALEY HERBERT BERGAMINI and associ ates—9 and Demonstr tion of fu ction g trau mat c and dustri l surgical clinic

W edne d y

JOSEPH A BLAKE and associates—9 Demonstration of treatment of fractures by su pens on and traction
WILLIAM V HEALEY HERBERT BERGAMINI and associ ates—9 and Demonstrat n f fu ctio ng trau mat and ndustrial su gical clinic

Th sday

JOSEPH A BLAKE and associates—9 Demonstr tion of treatment f fra tures by s spens on and traction
WILLIAM V HEALEY HERBERT BERGAMINI and associ ates—9 a d 2 Demonstr tion of functi n ng trau mat c and dustrial surgic l cl nic

F iday

JOSEPH A BLAKE a d associates—9 Demonstration of tr atm t f fractures by suspen on and t ction
WILLIAM V HEALEY HERBERT BERGAMINI nd associ ates—9 nd Demo tr ti n of functi ning t au mat c a d industrial su gical cl nic

CITY HOSPITAL

Tuesday

CHARLES G CHILD JR—11 Gynecological clinic
HOWARD D COLLINS—2 30 Abdominal operations
JAMES PEDERSON—2 30 Ge ito urin ry clinic

W edne day

EDWARD PINKHAM—11 Cynecologic l clin c
PARKER SYM — 3 Ge eral urgical clinic sacral anæsthes a

Thu sday

LYMAN W CROSSMAN and JOHN C VAUGHAN—11 General s rgical l nic.
NATHAN W GREEN—2 30 Gene l su gical clinic local a d sp l anæsthesia
J BAYARD CLARK —2 3 Genito u inary cl nic

Friday

DONALD GORDON and ERNEST A CAMPBELL—11 Frac tu clinic
ALBERT S MORROW—2 3 G neral surgical clinic

PENITENTIARY AND WORKHOUSE HOSPITALS

T sd y

EDW RD C BRE NER—9 Pr t tect mies perineal and prap b c under sacral and parasacral anæsthesia

W d day

EDWARD C BRENNER—9 Gynec log c l cl nic

Th sd y

EDW ARD C BRENNER—9 D e ses of the b l ry tract dem n tr t g the s rg cal pathol gy so freq ently fo and in drug addicts h thert unmentioned n liter ature

MANHATTAN MATERNITY HOSPITAL

Tuesday

J CLIFTON EDGAR HAROLD BAILEY HARVEY WILLIAMSON and F W GRAVELLE—10 Baby clinic Feeding of incubator babies Follow up of postpartum patients. Setting up for the delivery the home by house surgeon and pupil nurse

Wednesday

WILLIAM M FOX DAVID BARROWS RALPH W NUTTER and W H HAWKINS—2 Routine for admitting patients to the parturient clinic

Thursday

ALSTIN FLINT FREDERICK RICE FREDERICK C FREED and ARTHUR REICH—10 Filing of hospital records and keeping statistics

Friday

J CLIFTON EDGAR HAROLD BAILEY HARVEY WILLIAMSON and F W GRAVELLE—10 Operating room technique care of patients in ward Demonstration of electric breast pump Duchesne electric pad electric blanket for toxic treatment Gasthmyasic treatment

BETH DAVID HOSPITAL

Tuesday

LEO BUERGER—9 Urological clinic

Wednesday

JULIUS JARCHO—9 Obstetrical clinic
LEO BUERGER— Urological clinic.
CHARLES GOTTLIEB—2 X ray clinic

Thursday

L MILLER KAHN—9 General surgery
MAX ROSENTHAL—2 Gynecological clinic

Friday

LOUIS DROSIN—9 Obstetrical clinic
L J LADIN—2 Gynecological clinic

ST MARKS HOSPITAL

Tuesday

BENJAMIN T TILTON—3 Surgical clinic

Wednesday

VICTOR C PEDERSEN— Urological clinic

Thursday

WILLIAM A WILSON—1 Urological clinic

HARLEM HOSPITAL

Wednesday

THOMAS CHERRY— Radium in gynecology
JOHN F CONNORS— Intestinal obstruction
HENRY S PASCAL— Bladder stone

Friday

THOMAS CHERRY and ARTHUR STEIN— Gynecological *operations and demonstrations*
JOHN F CONNORS and PERRY S BOYNTON— Treatment of fractures

SKIN AND CANCER HOSPITAL

Tuesday

C A McWILLIAMS Demonstration of plastic surgery and operations for cancer

Wednesday

FRANZ TOREK Demonstration of plastic surgery and operations for cancer

Thursday

GEORGE S MAEN Demonstration of plastic surgery and operations for cancer

Friday

H H M LYLE *Demonstration of plastic surgery and* operations for ca

NEW YORK NEUROLOGICAL INSTITUTE

C A ELSBERG A S TAYLOR J H KENNARD BYRON STOOKEY—Tuesday Wednesday and Thursday 9 Operations on the central nervous system

KNICKERBOCKER HOSPITAL

Wednesday

JOHN DOUGLAS C A FRINK C G BURDICK J A BOHRER A S ARMSTRONG and G A. KOELSCH—9 End results of head injuries

Thursday

JOHN *DOUGLAS* C A FRINK C G BURDICK J A BOHRER A S ARMSTRONG and G A. KOELSCH—9 General surgical operative traumatic and emergency cases

Friday

JOHN DOUGLAS C A FRINK C G BURDICK J A BOHRER A S ARMSTRONG and G A. KOELSCH—9 End results in complicated old fractures

ITALIAN HOSPITAL

Tuesday

C SAVELLI and V TANONI—9 General surgery
V SELLARO and A SCATURRO— *Gynecology*

Wednesday

F E PARODI and G MUNNA—9 General surgery

Thursday

S SALADINO and D VIGGIANO—9 General surgery
D PETILLO and M CASO— Genito-urinary clinic

Friday

V COCUZZA and C TOMASELLO—9 Gynecology

FRENCH HOSPITAL

CHARLES H CHETWOOD and *JOHN D COOLEY*—Tuesday 2—Cystoscopic and pyelographic demonstration of new instruments. Wednesday 2—Operative clinic practical and nephrolithotomy
J P HOGARTY—End results in gynecological surgery
PERCY R TURNER —Results of operative and X ray treatment in sarcoma of the long bones

ROCKEFELLER INSTITUTE

ALEXIS CARREL and ALBERT H EBELING—Cinematographic demonstration of tissue growth
JAMES B MURPHY—Experimental analysis of the action of X-ray on cancer
WALTER H BROWN, LOUISE B PEARCE and C M VAN ALLEN—The relation of the thyroid to the malignancy of a transplanted neoplasm
HIDEYO NOGUCHI—Yellow fever
PEYTON ROUS—Physiological implications in cholelithiasis

LYING-IN HOSPITAL

STAFF—Obstetrical operations and demonstrations of interesting cases each afternoon
J T GWATHMEY—Demonstration of obstetrical algesia
J R LOSEE—Demonstration of interesting pathological specimens in the museum

LINCOLN HOSPITAL

Tuesday

WILLIAM C WHITE—3 Surgical clinic

Wednesday

SETH M MILLIKEN—3 Surgical clinic

Thursday

PERCY H WILLIAMS—3 Gynecological clinic

MT SINAI HOSPITAL

A A BERG and staff—General surgical clinic
EDWIN BEER and staff—General surgical clinic
C A ELSBERG and staff—General surgical clinic
A A MOSCHCOWITZ and staff—General surgical clinic
P W NATHAN—Orthopedic clinic
LEOPOLD JACHES—X-ray demonstrations

CLINICS IN BROOKLYN HOSPITALS

KINGS COUNTY HOSPITAL

Tuesday

E H FISKE—9 General surgical clinic
HENRY M MILLER—Demonstration of obstetrical conduction
HOMER E FRASER and CHARLES S COCHRAN—Gynecotourniquet clinic demonstrations of unusual cases

Wednesday

WILLIAM P HEITZER—9 Gynecological clinic
FRANKLIN B VAN WART—Demonstration of orthopedic cases and for ectopic appendicitis
RALPH C WILLIAMS—Demonstration of the pedic cases and for ectopic appendicitis

Thursday

JOSEPH TENOPYR—9 Demonstration of the treatment of fractures

Friday

RUSSELL M ROWE—9 General surgical clinic

BUSHWICK HOSPITAL

Tuesday

W E LIPPOLD and M B BERGMAN—9 Gynecological [illegible] operations
A M JUDD, PHILIP E SMITH—Gynecological clinic operations
JOSEPH B EPISCOPO—2 Orthopedic clinic

Wednesday

GEORGE H REICHERS and W W PHILDELMANN—9 General surgical operations
NATHAN ADLER, WILLIAM C JAYNE and ISIDOR TELLIT—2 Obstetrical clinic

Thursday

RUSSELL M ROWE and HECTOR W BEN—9 General surgical operations
GERARD KASPER and HARRY LIPTON—Gynecological operations

Friday

RICHARD C WEITH and GEORGE H PALMER—10 Genito-urinary clinic

METHODIST EPISCOPAL HOSPITAL

Tuesday

THOMAS B SPENCE, HENRY F GRAHAM, CHARLES H GOODRICH and H T LANGWORTHY—9 General surgical clinic
O P HUMPSTONE and staff—9 Obstetrical clinic

Wednesday

A H BOGART and ROGER DURHAM—9 General surgical clinic
O P HUMPSTONE and staff—9 Obstetrical clinic
E B SMITH—9 Pathological conference
WESLEY H WALLACE—9 X-ray treatment
J C GRAHAM—9 Radium treatment

Thursday

THOMAS B SPENCE, HENRY F GRAHAM, CHARLES H GOODRICH and H T LANGWORTHY—9 General surgical clinic
O P HUMPSTONE and staff—9 Obstetrical clinic
WESLEY H WALLACE—9 X-ray treatment
J C GRAHAM—9 Radium treatment

Friday

RUSSELL S FOWLER and HAROLD K BELL—9 General surgical clinic
O P HUMPSTONE and staff—9 Obstetrical clinic

LONG ISLAND COLLEGE HOSPITAL

Tuesday

JOHN O POLAK, ALFRED BECK and staff—9 Gynecological and obstetrical clinic

Wednesday

EMIL GOETSCH—9 Gotham demonstration of cases
S POTTER BARTLEY—9 Fracture clinic
ROBERT F BARKER—2 Demonstration of varicose veins

Thursday

JOHN O POLAK, ALFRED BECK and staff—9 Gynecological and obstetrical clinic
HENRY H MORTON, HOMER E FRASER and staff—3 Genito-urinary clinic

BROOKLYN HOSPITAL

Tuesday

W A Sherwood and J H Long—9 General surgical operations
R W Westbrook—9 General surgical operations
Mary H Combs—9 *Demonstration Social service department*
N P Rathbun and staff—1 Genito-urinary clinic
G H V Hunter and Donald McKenna—2 Orthopedic operations
John E Jennings—2 Dry clinic cases of chronic duodenitis in relation to biliary infections
Sidney Smith—3 Demonstrations results of radium in gynecological cases

Wednesday

John E Jennings and E K Tanner—9 Gall bladder surgery
R H Pomeroy and staff—9 Gynecological and obstetrical clinic
N P Rathbun and staff—9 Diagnostic clinic in urology cystoscopy urography demonstrations ureteral stricture
Ruth I Graham—2 X ray demonstrations surgical cases

Thursday

W A Sherwood and J H Long—9 General surgical clinic
W H Cary—9 Demonstration of sterility studies
G H V Hunter and Donald McKenna—9 Orthopedic operations
H A Fisher—9 Syphilis therapy clinic salvarsan familial syphilis follow up system
N P Rathbun and staff—1 Genito-urinary clinic
Calvin B Coulter—2 Demonstration of pathological material
W H Field—2 Diagnostic clinic general surgery

Friday

John L Jennings and E K Tanner—9 Operative clinic surgery of the thyroid
N P Rathbun and W F McKenna—9 Urological operations
W A Sherwood and staff—11 Surgical staff conference (review of the work of the previous week)
W A Sherwood and staff— Diagnostic clinic surgical out patient department

WYCKOFF HEIGHTS HOSPITAL

Tuesday

John L Bauer—9 General surgical clinic
Russell S Fowler—2 General surgical clinic

Wednesday

John Horni and Armin J Sibbel—9 General surgical clinic
Charles J Pflug—2 General surgical clinic

Thursday

John L Baler—8 General surgical clinic
Russell S Fowler—10 General surgical clinic
Thurston H Dexter—2 Pathological conference
Rudolph F Herrman —3 Obstetrical clinic

Friday

John Horst and Armin J Sibbel—9 General surgery

ST MARY'S HOSPITAL

Tuesday

W V Pascual and T M Brennan—9 General surgical clinic
J G Williams—12 X ray therapy high voltage treatment with demonstration of roentgen time measurement of dosage

Wednesday

J R Kevin and J P Murphy—9 General surgical clinic
J G Williams—12 X ray therapy high voltage treatment with demonstration of roentgen time measurement of dosage
R B Anderson—2 30 Urological operations under caudal and transcranial anesthesia

Thursday

W V Pascual and T M Brennan—9 General surgical clinic
J G Williams—12 X ray therapy high voltage treatment with demonstration of roentgen time measurement of dosage
V L Zimmermann—2 Emergency obstetrical operations
Surgical Staff— Dry clinic general surgery

Friday

J R Kevin and J P Murphy—9 General surgery
J G Williams—12 X ray therapy high voltage treatment with demonstration of roentgen time measurement of dosage
J C MacEvitt and J P Glynn—2 Gynecological clinic

ST PETER'S HOSPITAL

Tuesday

Joseph F Todd—8 30 Diagnostic and operative gynecological clinic
Gordon Gibson—10 3 Diagnostic and operative clinic prolapsus uteri
J Sturdivant Read—3 Diagnostic and operative urological clinic

Wednesday

Thomas M Brennan and Wm M Ellis—8 3 Diagnostic and operative clinic *demonstrations*

Thursday

Frederick C Paffard and James J Shay—8 3 Diagnostic and operative clinic gynecology of the upper abdomen
John D Rushmore and Lorne McD Rea — 9 Diagnostic and operative clinic general surgery

Friday

Gordon Gibson — 9 3 Diagnostic and operative clinic proctologic

NORWEGIAN HOSPITAL

Tuesday

E H Ferris—8 3 General surgery

Wednesday

Henry F Graham—8 30 General surgery

Thursday

E W Skelton—8 30 General surgery

Friday

Louis Stork—8 3 General surgery

ST CATHERINE'S HOSPITAL

Tuesday

DANIEL A MCATEER—9 General surgery
D GEORGE BODKIN—10 General surgery

Wednesday

JOHN F GRIFFIN—9 Urological clinic
JOHN M SCANNELL—9 General surgery local anæsthesia demonstration of direct blood transfusion method apparatus and technique
MARTIN L BODKIN—10 Proctologic clinic
M E MARTEN and F H NIDISH—2 Pathological demonstration

Thursday

FRANK D JENNINGS and D E MCMAHON—9 General surgery
CHARLES A GORDON EDWARD A FLEMING and JOSEPH A DRISCOLL—9 Gynecological clinic

Friday

DANIEL A MCATEER—9 General surgery
JOHN M SCANNELL—9 General surgery local anæsthesia
D GEORGE BODKIN—10 General surgery

JEWISH HOSPITAL

Tuesday

JOHN LINDER—9 General surgical clinic
LEO SCHWARTZ—2 Gynecological clinic
MAX LEDERER—2 Pathological conference

Wednesday

WILLIAM LINDER—9 General surgical clinic Demonstration of new method of local anæsthesia
ADOLPH BONNER—2 Gynecological clinic
M G WASCH—2 Roentgenological demonstration

Thursday

JOHN LINDER—9 General surgical clinic
LEO SCHWARTZ—2 Gynecological clinic
MAX LEDERER—2 Pathological conference

Friday

WILLIAM LINDER—9 General surgical clinic

CUMBERLAND HOSPITAL

Tuesday

WILLIAM L HEEVE—9 General urgical clinic
WILLIAM C DURRIN— Gynecological

Wednesday

JOHN F RAFFERTY—9 General urgical clinic
FREDERICK R MEEKS— Gynecological clinic

Thursday

HERBERT S DUCRET—9 General surgical clinic
MARCUS P SEARLE— Gynecological

Friday

ROBERT L WOOD and GEORGE S OGDEN—9 Obstetrical clinic

HOUSE OF ST GILES THE CRIPPLE

WILLIAM S HERRMANN FRANK F LYNE CHARLES D NEFF FRANK B KEYES JACQUES C RUSHMER—The Thomas Demonstration of the speech

HOLY FAMILY HOSPITAL

Tuesday

JAMES M DOWNEY—9 General surgical clinic
EDWARD MORRIS—2 Gynecological clinic

Wednesday

WILLIAM PFEIFFER—9 Gynecological clinic

Thursday

EDWIN H FISKE—9 General surgical clinic

GREENPOINT HOSPITAL

Tuesday

ANGELO L SORESI—9 General surgical clinic

Wednesday

CHARLES A GORDON—9 Gynecological clinic
JOHN M SCANNELL—9 General surgical clinic

Thursday

JOHN M SCANNELL—9 General surgical clinic.

Friday

CHARLES A GORDON—9 Gynecological clinic.

PECK MEMORIAL HOSPITAL

Tuesday

JOHN F RAFFERTY—9 General surgical and gynecological clinic
ROBERT WOOD—9 Obstetrical clinic

Wednesday

WILLIAM PFEIFFER—9 Obstetrical clinic
GEORGE H TYLER— General surgical clinic

Thursday

THEODORE VOSSELER—9 General surgical clinic
OSLOW A GORDON JR—9 Obstetrical clinic

Friday

CHARLES COCHRANE—9 General surgical clinic.

ST JOHN'S HOSPITAL

Tuesday

H BEECKMAN DELATOUR—9 General surgery
STANLEY B THOMAS—2 General urgery

Wednesday

GEORGE F SAMMIS—9 General surgery
ALFRED W WHITE—2 Obstetrics

Thursday

WILLIAM H RANKIN—9 General surgery
HAROLD K BELL—2 General surgery

Friday

WILBERT I DUFFIELD—9 General surgery
JOHN C KNAPP— Roentgenological demonstration

BROOKLYN CANCER RESEARCH HOSPITAL

WILLIAM FRANCIS CAMPBELL HOWARD T LANGWORTHY L P YATES WILKIE and EMIL F KOCH—Tuesday 2 Cancer clinic Cancer with the basilar results from treatment roentgen therapy in cancer methods of typing cancer

MIDWOOD SANITARIUM

Tuesday

BURT D HARRINGTON and CAMERON DUNCAN—1 General surgery and gynecology

Wednesday

BURT D HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

Thursday

BURT D HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

Friday

BURT D HARRINGTON and CAMERON DUNCAN—10 General surgery and gynecology

UNITY HOSPITAL

Tuesday

A M JUDD Intestinal gynecological operations
ONSLOW GORDON JR Operations during pregnancy

Wednesday

GEORGE I MILLER Several cases of blood transfusion Demonstration of direct blood transfusion instruments Abdominal operations

Thursday

RALPH M BEACH Interesting gynecological operations

Friday

GEORGE I MILLER Operations on the gastro-intestinal tract Direct blood transfusion

U S NAVAL HOSPITAL

Tuesday

CAPTAIN NORMAN J BLACKWOOD and staff—10 Genito-urinary diseases

Thursday

CAPTAIN NORMAN J BLACKWOOD and staff—1 Roentgenological demonstrations

Friday

CAPTAIN NORMAN J BLACKWOOD and staff—10 Diathermy and electrotherapeutics

CONEY ISLAND HOSPITAL

Tuesday

VICTOR A ROBERTSON—2 General surgical clinic diagnosis and treatment of the more common fractures, including the application of calipers and Steinmann pins pre-operative and postoperative study of surgical cases

Wednesday

JOHN A SHIELDS—2 Gynecological clinic diagnosis and treatment of abortion and chronic pelvic infections.

TRINITY HOSPITAL

WILLIAM FRANCIS CAMPBELL and HOWARD T LANGWORTHY—Thursday 2 General surgical clinic

ST CHRISTOPHER'S HOSPITAL

HERBERT C FETT—Tuesday 8 Orthopedic clinic

SURGERY OF THE EYE EAR, NOSE AND THROAT

CLINICS IN NEW YORK HOSPITALS

NEW YORK EYE AND EAR INFIRMARY

Tuesday

CLYDE E MCDANNALD GEORGE H BELL CONRAD BERENS W B DOHERTY W R BEDINGFIELD J A RENWICK KELLY COX and B L MILTON—1 Eye clinic After treatment and follow up

CONRAD BERENS—10 Lantern slide demonstration of intra-ocular and orbital tumors

STAFF—10 Ortholgic clinic rounds dressings etc

E D BURCHALL—10 Lantern slide demonstration and exhibition of specimens of normal and abnormal temporal bones

GEORGE H BELL—2 Operations on the eye

CLYDE E MCDANNALD—Reese resection for strabismus Reese ptosis operation Extirpation of lachrymal sac

CONRAD BERENS—2 Suture in cataract extraction Plexiform muscle operation for strabismus

ROBERT LEWIS T LAURENCE SAUNDERS and assistants—2 15 Otological operations and demonstrations

Wednesday

ROBERT G REESE BENWITT KEY AQUIN S KELLY C A DRAKE I D KRUSEN W B ALLEN SHOBER SMITH KELLY COX B L MILTON W B BEDINGFIELD and J A RENWICK—10 Eye clinic After treatment and follow up

GEORGE S DIXON—10 X ray localization of foreign bodies in the globe Demonstration of X ray plates of mastoids and sinusitis

STAFF—10 Otological clinic rounds dressings, etc

ROBERT G REESE and AQUIN S KELLY—Cataract extraction in the capsule Reese resection for traumatisms Reese ptosis operation Iridectomy with cyclodialysis flap for glaucoma Modified enucleation with gold ball implant Capsulectomy with Reese knife Extraction of complicated cataract under a conjunctival flap

E B DENCH CHARLES E PERKINS FRED WHITNEY and assistants—2 5 Otological operations and demonstrations

Thursday

JOHN M WHEELER WEBB W WEEKS J H DUNNINGTON R L DURFEE and A B REESE—10 Eye clinic. After treatment and follow up

E D BURCHALL—Lantern slide demonstrations and exhibition of specimens of normal and abnormal temporal bones

STAFF—1 Ortholgic clinic rounds dressings etc

JOHN M WHEELER—2 Operations for contracted orbit and excavation

WEBB W WEEKS—2 Trephining for chronic glaucoma Recession for strabismus

ROBERT LEWIS T LAURENCE SAUNDERS JOHN MCCOY and assistants—2 5 Otological operations and demonstrations

Friday

FRANCIS W SHULTZ BERNARD SAMUEL R L DURFEE and A B REESE—1 Eye clinic. After treatment and follow up

B Samuels a d M L Berliner—10 Demo strat n of G llstrand slit l mp \an Hess differe t al p p llo- sc pe and Koeppe s eye microsc pe
G S Dixon—10 Lo alizat n of f reign bodies in the globe Dem nstrat n of X ray plates f mast ditis and s nusitis
Staff—10 Ot l g cal l nic rounds dressings etc
F W S ll e—2 Mota operation f r pto t
Bernard Samuels—2 Reese resect n f stral mus R ese ptosis operation E cleati n w th g ld ball implant
F B Den ll Charles F Perkins Frederick Whiting nd assi t nts—2 15 Ot l gic l operation and demo trat on

BELLEVUE HOSPITAL

Tuesd y

Wesley C Bo vers— Radical operat on n mastoi l with dem strat n f impro em nt of hearn g rather th n les ening p esent ti f cases
J D Kernan— Bronchoscop c tre tme t of l ng b scess versus e tern l su gery with xhibit on f tech n que and prese tat n f cases
Staff—10 Nose a d th oat l ic Ro nds dres gs dem nstrati n of i teresting ases
J Wolff—10 Fy clinic \fter t e tm nt a d f llow up
S A Agatston—2 Eye h i Re ess n ope ati n
C G Coakley nd assoc ates— Otological perat o a d d m strat on f cases

W d sd y

J W Fowlkes— o D mo trat ng the B lle m th od of to ll tomy a d lig t on f essel P sent ti n f cases o y r after perat n h wt g result
Staff— Nos a d throat cl Rounds dress gs demo stratio of teresti g ases
S Agatston— Eye cl n After t eatment nd f l low up
C G Coakley nd associates— Ot l g al perati s nd d m t ti n of ases
C H May— \d n me t perat ns

Th day

R T \tkins— o F tern l perat n on the para l s n s s with p esentat on of e
Staff—1 N d th t l nic Ro nd d es ng d m n trat of nt rest g cases
C H May— o Fy cl nic After t eatment a d f llo up
C G Co kl y d assoc ates— Ot l gical operat o a d d m nst at o f cases
J Wolf —2 C t r t e tra ti w th saf ty fl p

F day

Staff— Nose l th at cl c R d d s i g demo trat n f t est g a
W B Doi erty— I ye cl c After tr tme t a d f llow up
W B Doherty—2 En l ti n w th impl t f rt l ge
C G Co kley nd a so ates— La n d thr t cl s

BETH ISRAEL HOSPITAL

F d y

S J Ko etzky—9 Path logy f m ddl ea i f ct ons
A A Schwartz— o Cases f l byn thi d ea
Felix C hn d staff— Ot laryngolog al l nic
S J Ko etzky nd st ff—3 Ot l g l cl

MANHATTAN EYE EAR AND THROAT HOSPITAL

Tuesday

Frederick M Law— o D agnostic value of X ray in s nus nd ma toid ond t ons
Staff— o Demonstration of otol gical cases
Staff—10 Demonstr tion of n s and thro t cases
Staff—10 Dem nstratio of eye cases
Wendell C Phillips F P Fowler and staff—2 Oto- logical ope tions nd demo tration of cases

W d esday

\ndrew A Eggston—10 Blood transfusi n i lateral nus thrombosis
Staff— o Demonstration of otol gical cases
Staff—10 Demonstrati of nose and throat cases
Staff—10 Demonst tio of eye cases
Arthur B Duel P D Kerrison and staff—10 Oto logical operat ons nd dem stration of cases

Th sday

Fredfrick M Law— Di g ost c v lue of X ray in inus nd masto d c nd t n
Staff—10 Demonstration of ot l gical ases
Staff—10 Demonstration of n e and thro t case
Staff—10 Dem n trati n of ey ca es
John R Page John D Richards and staff—2 Oto log c l operation a d d m nstrati n f cases

Fr d y

Harris A Houghton— o Masto diti in diabetics
Staff— o Demonstrati n f ot logi al ca es
Staff— Dem nstrati n of e a d throat cases
Staff—10 D monstrat on of eye cases
John B Rae W C McFarland a d taff—2 Otol gic l operati s a d dem nstrati n f cases

D ys t b in c nc d

Harmon Smith Samuel McCullagh F Ross Faulkner nd Joi n E Mackenty—Rh olog cal and laryngo l g cal cli cs
Edgar Thomson Charles Kinney John Shannon and Herbert Wootton—Ophthalm logical clinics
Guilford Robinson—Radium tre tment of diseases of ye r o e a d thro t
A A Eggston—P thol g al dem nstrati ns
C J Imperatori—The te hn qu f bro choscopy
H A Holghton—R lat on hip f met boli m t d seas s of the nose th oat and r

ST LUKE S HOSPITAL

T day

C W Cutler Alfr d Wiener Isaac Hartshorne and taff— Ope at n n the eye
E B Dench—2 E r cl nic demonstrat on of cases

W ed e d y

A P Voislawsky W M Hunt M H Merriman and L T Perrault—2 30 Ope at ve n se and throat cl nic

Th sday

A P Voislawsk W M Hunt M H Merriman and L T Perrault—2 Res lts f tons ll ctomy
E B Dench a d staff— 5 Otological operations

Frid y

C W Cutler Alfred Wiener Isaac Hartshorne and taff—2 Ey cl nic

NEW YORK POST GRADUATE HOSPITAL

Tuesday

T J HARRIS—1 30 Nose and throat clinic
W C MCFARLAND—2 30 Otological operations
MARTIN COHEN—3 30 Eye clinic Ptosis operation Heisrath Khunt operation for plastic tirpation of lachrymal sac bilateral advancement Elliots trephining operation cataract extraction

Wednesday

DUNCAN MACPHERSON—1 30 Nose and throat clinic
ROBERT L LOUGHRAN—2 3 Otological operations
A EDWARD DAVIS—3 30 Demonstration of administration of lens antigen extract for prevention of cataract operation for squint and ptosis

Thursday

T J HARRIS—1 3 Nose and throat clinic
W C MCFARLAND—2 30 Otological operations
MARTIN COHEN—3 3 Eye clinic

Friday

DUNCAN MACPHERSON— 30 Nose and throat clinic
ROBERT L LOUGHRAN— 30 Otological operations
E M ALGER—3 30 Eye clinic

POLYCLINIC HOSPITAL

Tuesday

E R FAULKNER— Nose and throat clinic

Wednesday

J M SMITH E D NEER and G E DAVIS—Otological clinic

Friday

G H BELL J A KEARNEY and C E MCDONALD—Eye clinic

FIFTH AVENUE HOSPITAL

Wednesday

L E HETRICK—2 Otological clinic Radium implantation operation
WESTLEY M HUNT— Rhinological and laryngological clinic

Friday

DEWAYNE HALLETT—9 Ophthalmological clinic
HAROLD FOSTER—2 Laryngological clinic
JOHN W WHEELER—2 Ophthalmologic clinic

METROPOLITAN HOSPITAL

Wednesday

C C BOYLE—2 Transplantation of bone from cartilage into sclera Radical mastoid
J E TYTLER—3 3 Rhinological and laryngological clinic

CORNELL UNIVERSITY MEDICAL COLLEGE

Tuesday

BERNARD SAMUELS L A DRAKE and M L BERLINER—2 Ophthalmological clinic Demonstration of Gullstrand slit lamp

Friday

ROBERT G REESE and GEORG W VANDERCRIFT—2 Ophthalmological clinic

MT SINAI HOSPITAL

Tuesday

ISADORE FRIESNER and staff—9 30 Demonstration of otological and neurological cases and operations.
S YANKAUER—2 Operative nose and throat clinic, bronchoscopy

Wednesday

J WOLFF— Cataract extraction with conjunctival safety flap
K SCHLIVEK—2 Plastic operation for ectropion
C BARNERT— Demonstration of block ænesthesia of the ciliary plexus
I GOLDSTEIN—2 Extirpation of lachrymal gland

Thursday

ISADORE FRIESNER and staff—9 30 Demonstration of otological and neurological cases and operations.
S YANKAUER and staff—2 Bronchoscopies and œsophagoscopies

Friday

ISADORE FRIESNER and staff—9 30 Demonstration of *otological and neurological cases and operations*
S YANKAUER and staff— Nose and throat operations

LENOX HILL HOSPITAL

Wednesday

ERNEST F KRUG and W F STEINBUEGLER—2 Study of after-cataract with the Gullstrand slit lamp

Thursday

JOHN D KERNAN and GERARD F OBERRENDER—2 Bronchoscopic treatment of lung abscess
RUDOLPH C DENIG and JOHN J REID—2 Treatment of fresh eye burns Operations of the eye

CITY HOSPITAL

Wednesday

DANIEL S DOUGHERTY—2 30 Oto-laryngological clinic operation and follow up

Thursday

W WHITEHEAD GILFILLAN— 30 Ophthalmological clinic

Friday

DANIEL H WIESNER and PERRY BARTLETT HOUGH—2 3 Ophthalmologic clinic

ST VINCENTS HOSPITAL

Tuesday

FRANCIS J QUINLAN—2 Exhibit of nose and throat cases discussion how to operate

Wednesday

JOHN D KERNAN— Operations and clinical demonstration of minor cases.

GOUVERNEUR HOSPITAL

W W CARTER—Tuesday Plastic operations for nasal deformities Bone transplantation for nasal deformities

ST MARKS HOSPITAL

Thursday

C J E TUCK—1 3 Operation for [illegible] deformities

ITALIAN HOSPITAL

Wednesday

M Lombardo and T R Paganelli—2 Eye clinic

Friday

S Levey and J Paganelli— Ear nose and throat clinic

FLOWER HOSPITAL

Tuesday

L E Hetrick—9 Otological clinic
E S Murphy—2 Ophthalmological clinic

NEW YORK INFIRMARY FOR WOMEN AND CHILDREN

Anna Belcher—Friday 2 Nose and throat clinic

BETH DAVID HOSPITAL

S J Kopetsky—Tuesday 2 Otological clinic

ST MARY'S HOSPITAL

Staff—Wednesday 9 Consultation

FORDHAM HOSPITAL

Tuesday

Charles Graef and staff—2 Ophthalmology

Thursday

W M Dunning S H Gasch and staff—9 Oto-laryngological clinic

KNAPP MEMORIAL EYE HOSPITAL

Arnold Knapp and associates— daily Operations on the eye Demonstrations of cases

LEBANON HOSPITAL

M D Lederman and I M Heller—Friday 2 30 Oto laryngological clinic

HARLEM HOSPITAL

L M Hubby—Thursday 10 Tonsillectomy Modified radical mastoid operation

KNICKERBOCKER HOSPITAL

J Edgar Welch—Tuesday 3 Tonsillectomies

CLINICS IN BROOKLYN HOSPITALS

BROOKLYN EYE AND EAR HOSPITAL

Tuesday

Fred D Bailey and J J Madden—2 Demonstration the Gullstrand lamp and corneal microscope

Wednesday

George E Deely—2 Operations for squint cataracts etc

Thursday

W C Braislin— Radium stoid

Friday

Claude G Crane— Demonstration Bacteriological examination of the ear with demonstration of cases

ST CATHERINE'S HOSPITAL

Tuesday

G G Fisher—1 Ear nose and throat clinic

Wednesday

S H DeCoste— Ear nose and throat clinic

Thursday

G G Fisher—1 Ear nose and throat clinic

Friday

G G Fisher— Ear nose and throat clinic

BROOKLYN HOSPITAL

C G Crane F H Lasher and J M Taylor—Wednesday 2 3 Operative clinic in oto-laryngology Demonstration of the œsophagoscope and bronchoscope

CONEY ISLAND HOSPITAL

Lefferts A McClellan—Thursday 2 Special surgical clinic devoted to ear throat examination removal of tonsils and adenoids

HOLY FAMILY HOSPITAL

George F Deely—Friday 9 Ear and throat clinic

ST PETER'S HOSPITAL

Edward R Dorney—Tuesday 3 Nose and throat clinic

LUTHERAN HOSPITAL

Tuesday

Alexander Gilligan—9 Submucous resection of nasal septum setting and prone position local and general anæsthesia

Wednesday

Alexander Gilligan—9 Tonsillectomy and adenectomy local and general anæsthesia Sluder technique

Thursday

Alexander Gilligan—9 Correction of nasal deformities as the columella rotate

Friday

Alexander Gilligan—9 Enteration of ethmoid Puncture and irrigation of maxillary antrum

PECK MEMORIAL HOSPITAL

Tuesday

J Alexander Stewart— Nose and throat clinic

Wednesday

Royal A Abbott—9 Nose and throat clinic

CUMBERLAND HOSPITAL

Thursday

J A Stewart—1 30 Nose and throat clinic

Friday

Royal A Abbott— Nose and throat clinic

KINGS COUNTY HOSPITAL

John W Durkee—Wednesday 10 Otological clinic demonstration of unusual eye conditions

WYCKOFF HEIGHTS HOSPITAL

Robert L Moorhead and Harry Meyersburg—Friday Nose and throat clinic

U S NAVAL HOSPITAL

Capt [illegible] Norman J Blackwood and staff—Wednesday 9 Eye ear nose and throat cases

SECTIONAL MEETINGS FOR WASHINGTON OREGON AND BRITISH COLUMBIA, IDAHO MONTANA WYOMING UTAH AND COLORADO MANITOBA SASKATCHEWAN ALBERTA, NORTH DAKOTA AND MINNESOTA

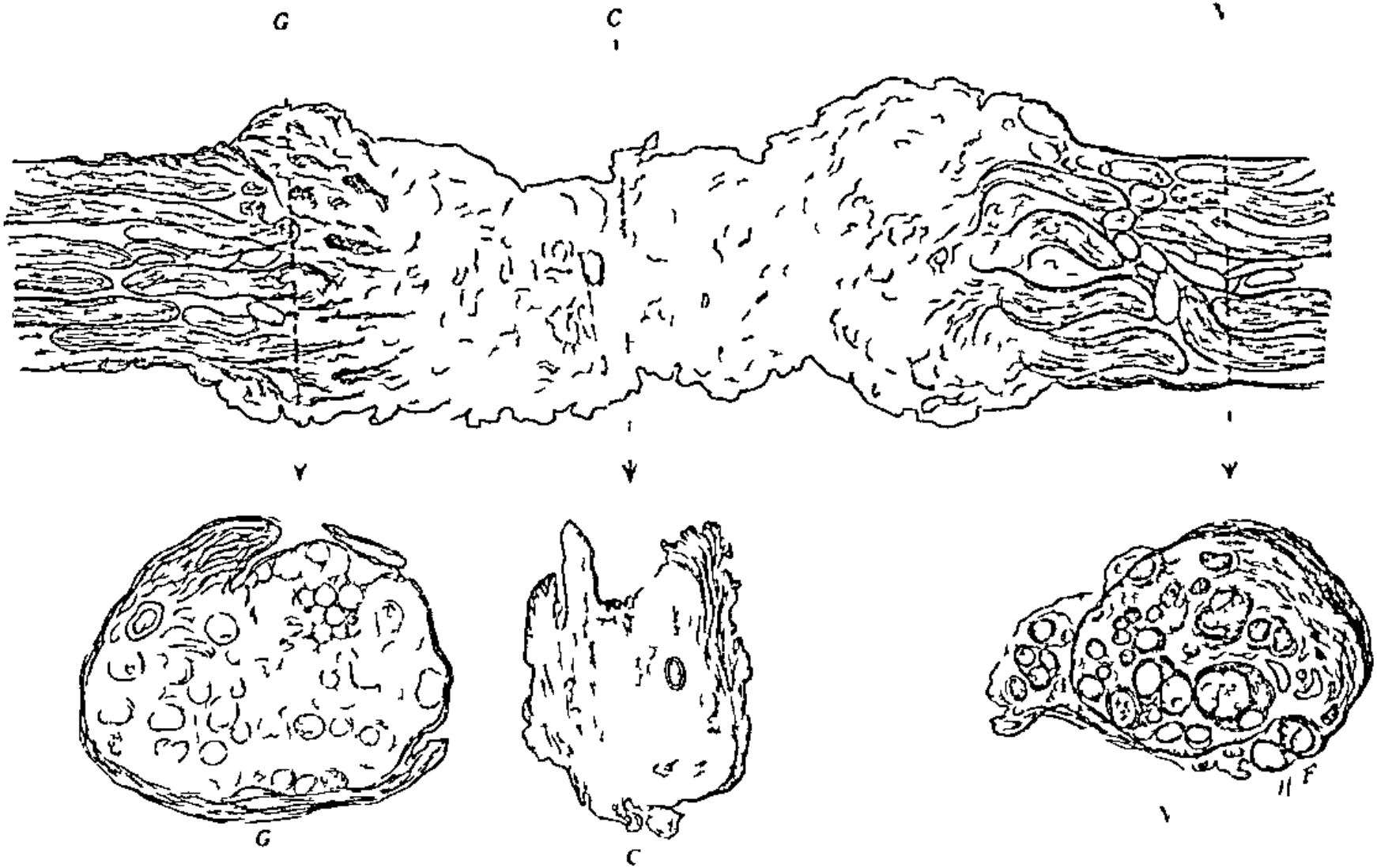
DURING the month of August and the first week of September three Sectional Meetings of the Clinical Congress of the American College of Surgeons were held

The meeting for Washington Oregon and British Columbia took place in Everett Washington on August 11 and 12 Headquarters registration and all sessions except the public meeting were in the Everett High School The public meeting was conducted on the evening of the 11th in the Rose Theatre Clinics and clinical demonstrations were held in the local hospitals Dr C J Lynch of Yakima presided at the meetings The visiting speakers were Dr T J Watkins Chicago Dr Ernst A Sommer Portland Dr R C Coffey Portland Dr M T MacEachern Chicago and Dr Allan Craig Chicago It was decided to hold the next meeting in Portland Oregon Following the scientific session on the second day a large number of those present motored to the Big Four Inn and joined in the annual session of the Washington State Medical Society

The Sectional Meeting for Idaho Montana Wyoming Utah and Colorado was held in Pocatello on August 25 and 26 Headquarters and registration were at the Bannock Hotel All the sessions including the public meeting were conducted in the Auditorium of the Pocatello High School Clinics and clinical demonstrations were carried on each morning in the local hospitals Dr W F Howard presided at the meetings The visiting speakers were Dr R C Coffey Portland Dr Ernst A Sommer Portland Dr M T MacEachern Chicago and Dr Allan Craig Chicago Governor C C Moore of Idaho opened the public meeting with a very stirring address Next years meeting is to be held in Butte Montana

The Sectional Meeting for Manitoba Saskatchewan Alberta North Dakota and Minnesota was held in Winnipeg on September 2 and 3 at the Fort Garry Hotel The public meeting was held in the Central Congregational Church There were clinics and clinical demonstrations each morning in the local hospital The visiting speakers were Dr R C Coffey Portland Dr Carl Hedblom Rochester Minnesota Dr S W Prowse Winnipeg Dr M T MacEachern Chicago and Dr Allan Craig Chicago Dr Alex R Falconer of Dunedin New Zealand took part in the hospital session Dr James McKenty presided at all the meetings The definite time and location of next years meeting was not fully decided

All these meetings were well attended and it was especially noted that a large number of representatives from the various hospital were present at the hospital sessions Too much could not be said in appreciation of the energetic efforts put forth by the local committees in carrying on these sectional meetings



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SURGERY, GYNECOLOGY AND OBSTETRICS

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A CONTRIBUTION TO THE STUDY OF THE SURGICAL REPAIR OF PERIPHERAL NERVES

BASED ON THREE HUNDRED AND SEVENTY FIVE CASES

BY HENRI DELAGÉNIÈRE LE MANS FRANCE

BEFORE the war I had the opportunity to perform a certain number of nerve sutures immediately following injury Usually these were cases of complete section of the nerve produced either by the end of bone in certain fractures by gunshot wound or by a knife In every case immediate operation was necessary because of the seriousness of the wound and in every case the suture which was done after freshening the nerve end resulted in a functional cure On the other hand I have performed resection of the cut ends for an old section of the radial nerve following which I did an end to end suture A complete cure with a return of entire function was obtained at the end of 10 months

It became evident during the war that if wound of the peripheral nerves were to be treated surgically with success certain rules would have to be established and a proper technique based upon the results that had been obtained would have to be standardized Following the wounded men after operation was a serious difficulty

With the hope of securing success and as chief surgeon of the Fourth Army Corps I obtained the authority to group all these cases in a hospital near Le Mans All the wounded who had been operated upon for lesions of the peripheral nerve in my sector were assigned during the period of convalescence to Dr Tinel a famous neurologist and chief of the neurologic service of the Fourth Corps All the wounded were examined before operation at the neurological center They were operated upon by myself or by my colleagues who were doing research work with me at the time After the wound had entirely healed they were evacuated to a special hospital and were visited by Dr Tinel every 15 days until their complete cure

We were able to follow 375 wounded men whose cases were divided as follows

Simple neurolysis	113
Resections and sutures	236
Nerve grafts	9
Resection and immediate suture for causalgia	17
	375

The 113 neurolyses did not give good results except in those cases in which there was a simple compression without a demonstrable lesion of the nerve In these recovery was rapid and complete In the other cases which were by far the greater number operation did not give as favorable results as did non intervention which was advised by Tinel It was nearly always found that the nerve was compressed or strangled presenting an interstitial lesion (neuroma or cheloid) which pre

Th pe ra ted fed f for h ho b Philip Le MD assistant professo h ped g ry N th es L ty Med School Ch go

vented the reconstruction or the re establish ment of its functions

The 236 nerve resections followed by suture can be divided into 142 sutures performed correctly that is to say they conformed to the anatomical and physiological require ments of reconstruction of the nerves and 94 sutures performed incorrectly or by employing poor technique

These two figures have been corrected since I published my former figures in which 39 observations classed in the beginning among the correct sutures were later classified among the incorrect sutures because the entire central end of the nerve was a neuroma At the beginning I thought that resection would not have to be performed farther back than the point where the first nerve fascicul appeared This was an error in technique that we have since recognized

The 142 correct sutures have resulted in 122 complete successes (85 9 per cent) 16 partial successes and 4 failures

On the other hand the 94 incorrect sutures have given only 6 complete successes 37 par tial successes and 51 failures (54 2 per cent)

In order to explain the poor results of the incorrect sutures it will be sufficient to enu merate the methods employed

Eight sutures where nerve ends were far apart with the interposition of strands of catgut	8 failures
Eight sutures after division and reversing of the nerve	8 failures
Three anastomoses of the 2 living ends of the nerve with an ad joining nerve	3 failures
Six mi cellaneous	6 failures
Six conical resections of the central end and two partial successes	4 failures
Sixty five in which the resections of 1 or both ends of the nerve were insufficient	22 failures

There were but 6 good results and 35 partial successes

I will now present two tables showing the results obtained in the individual nerves in which the sutures were performed correctly and in which the sutures were performed in correctly

TABLE I —SUTURES CORRECTLY PERFORMED

NERVE	No of cases	Complete success	Partial success	Failures
Radial	7	37 (85 9%)	7 (8 6%)	3 (6 9)
Ulnar	3	(5 6%)	(3 4%)	(4 3)
Median	5	3 (66 66%)	(33 3 %)	
M sc lo-cuta	5	5 (00%)		
B achial ple us		(5 %)	(5 %)	
Sc tic rve trunk	5	3 (%)	(8)	
Ex I popl t al	5	(93 33%)	(6 66%)	
Int rnal popl te l	4	(00%)		0
Poste io tibial	6	6 (00%)		
		(85 9 %)	6 (1 26%	4 (8)

TABLE II —SUTURES INCORRECTLY PERFORMED

NERVE	No of case	Complete success	Partial success	Failures
Radial	8	(7 4%)	5 (7 8)	1 (7 5)
Ulnar	3	(8 69%)	9 (39 3%)	(3)
Media		(8%)	6 (8 %)	6 (9%
Sciatic n rve trunk	3		8 (6 33)	5 (33 3%)
E t rnal popli al	8		5 (6 5)	(37 5)
I rnal popl eal	3		(3 33%)	(66 66 %
Pos rio ibial	5		3 (60%)	( )
	94	6 6 38%)	(39 36%)	5 5 3)

Concerning the results of the wounded operated upon during the years of 1915 and 1916 and during the early months of 1917 all the observations were studied by Dr Tinel and were given in October, 1917 in a report to the military authorities At that time the details of the technique had not yet been worked out It is probable that the results of our operations would have been more favor able but it was impossible for me to complete my investigations because of the military requirements in the Army Corps which made it necessary to give up those special hospital which had been at my disposition

Meanwhile I was able to make importa t observations which would aid in obtainin good results in nerve sutures I shall enumer ate them as follows

1 The earlier the suture is performed the more rapid is the regeneration The correct ness of this statement i proved in the case of

causalgia treated by resection followed by immediate suture and in the case of suture made at the time of injury

2 In the case of delayed suture the regeneration is simply delayed but eventually it should be just as complete We have had complete and excellent results in the case of a suture performed as late as 28 months after the injury No matter how old the wound it is worth the trial of operation

3 The regeneration appeared to be much quicker when there was complete physiological interruption but no separation of the ends of the nerve With the separation of the two ends regeneration is less rapid just as in the case where the peripheral segment was very markedly disorganized

4 The radial musculocutaneous and external popliteal nerves regenerate most quickly The internal popliteal the ulnar and the median regenerate with greater difficulty This is due to the fact that there is a greater number of sensory fibers which go to make up the nerve and to the danger of aberration of the nerve fibers in the new formation The motor fibers grow down into the open sheaths of the sensory fibers and vice versa This produces a type of useless regeneration (Tinel)

The general practical considerations and the operative results afford an important contribution to the elaboration of good operative technique but before establishing this technique it seems important to recall to mind a few words about the degeneration and regeneration of nerves

All the nerve fibers sectioned undergo a centrifugal degeneration at the peripheral end (wallerian degeneration) in fact one sees the axis cylinders become fibrillated and fragmented or completely disappear The myelin sheath becomes irregular and sinuous and its segments finally disappear During this time the sheath of Schwann proliferates and forms an empty sheath in place of the nerve fibers The central ends undergo a like change with moderate retrograde degeneration which ascends This ascending retrograde degeneration is quickly limited and ceases as soon as the regeneraton begins

See Tinel Nerve Wounds published by Masson Paris

This affects the penetration and descent of the axis cylinders from the central end in the open sheath of the peripheral segment The axis cylinders are attracted by the sheath This phenomenon is known in physiology by the name of neurotropism In proportion to the progress of the axis cylinders there is a new myelin sheath produced The axis cylinders progress about 1 to millimeters a day depending upon the age of the nerve wound and the age of the wounded man

This explains the very long time required for the nerve to regenerate and likewise when the anatomical reconstruction has occurred it requires still more time for the nerve to recover its physiological function

If in the case of a nerve section the two ends are in contact or are separated by a very short space the regeneration can occur normally but if the two ends are too far separated or if there exists between the two ends a space that cannot be bridged the regeneration cannot occur From the central end the axis cylinders proliferate but these cannot be attracted by the sheath and therefore curl up upon themselves and at the central end there is formed a small tumor called a cheloid or neuroma It is this which prevents regeneration of the nerve The peripheral end of the nerve also presents a small tumor mass or false neuroma which in reality is a glioma (Nageotte) This is made up of the excessive proliferation of the cells from the sheath of Schwann and completely surrounds and isolates the tubules at the peripheral end

If the nerve itself has an injury sufficiently severe to cause the physiological section of the nerve without solution of the continuity of the sheath there results instead of regeneration the formation of a tumor which is found at the site or close to the region traumatized This also results in the formation of a neuroma (see Fig A A and G) at the level of the central end and a glioma at the level of the peripheral end The two tumors are found close to each other sometimes without transition and on the contrary sometimes separated (see Fig A C) by a tract of fibrous tissue of varying length composed of neighboring and nerve tissue and by the retraction of the traumatized fibers of the sheath of Schwann

At the side of this neuroglioma one can find a *pseudoneuroma resulting from the in* terstitial hæmorrhage around the thickness of the nerve which becomes fusiform and elon gated If the lesion affects only a small portion of the nerve the phenomena of regeneration will be the same for each bundle injured

The neuroma occupies only one portion of the thickness of the nerve but it always be haves in the same manner and hinders the axis cylinders from growing out around the tubules neces ary for regeneration

I shall pass now to review the principal lesions which can affect the peripheral nerves These lesions are not always apparent It should be remembered as a fact that a nerve can be ectioned from the physiological stand point in which ca e there will be no visible section We must also bear in mind that a recent or fresh nerve lesion does not pre ent the same picture as does an old lesion From this point of view it will be useful to study the nerves (1) at the time of injury and (2) some time after the injury

1 *At the time of the injury* The nerve perhaps is sectioned by a sharp instrument or contused and crushed with or without eparation of the two ends by a blunt in strument such as a piece of shell In the first instance the lesion is clean cut and is less serious than in the second case It is more difficult to appreciate the extent and the gravity of the latter type of a lesion which always extends beyond the appreciable limits of the view It is at the outer borders of the visible lesion where the neuroma and cicatri cial tissue which prevent the regeneration of the nerve later forms (Fig B)

With this reservation made when one examines a wounded nerve in a fresh wound the nerve is completely sectioned the con tinuity is con erved or it has been torn from one of its end If it is completely sectioned the central end usually retracts (see Fig B 1 and 3) and the cut nerve bundles can be seen These become more clearly visible when the nerve end is compressed between the ends of the fingers The sheath of Schwann may be slightly retracted and form about a millimeter from the section a little circular pad or cushion more or le regular which usually is ea ily distinguishable The peripheral end is u ually sectioned more cleanly On slight pres sure between two fingers one cannot make the nerve fibers stand out but one does show the sheath The sheath of Schwann is equally more difficult to distinguish If the nerve has conserved its continuity one is able to observe all the possible lesions which one is able to classify into the following types

1 *Simple contusion* The nerve is hard in its contused portion and gives one the sensa tion of palpating wood One is able also to observe a slight bloody infiltration at the level of the contusion (see Fig B)

2 *An interstitial hæmatoma* in the nerve which presents a demonstrable nodule to the view and to palpation and which sometimes reaches the size of a small hazel nut This hæmatoma has a violet or brownish color preventing one from seeing the exact con dition of the nerve tissue Sometimes it hides a complete section of the nerve where the two ends are held in contact by the sheath of Schwann which remains intact One can never be too careful in deciding whether the nerve should be treated by resection and suture or be allowed to take care of itself

3 A *lateral indentation* (see Fig B 3) The little wound forms in these cases a sort of notch in the border of the nerve The borders of the notch are crushed not smooth and do not always permit you to observe all parts of the nerves and therefore to treat them properly Moreover I have observed that partial resection of the nerves with certain exceptions do not give as good results as total resection

4 *Perforation of the nerve* (see Fig B 4) The nerve should be examined with the greatest care because very often a perforation will be mistaken for a simple contusion and when the exact lesion is determined it is neces ary to treat it by resection and suture for the reason that the lesion probably in volves the nerve tissue Finally if the nerve is torn at one of its end as we sometimes see in the very severe large wound one must preserve it carefully and look further for the other end which was left in the wound and perform a suture Sometimes the stump of the nerve is much elongated sometime it ha

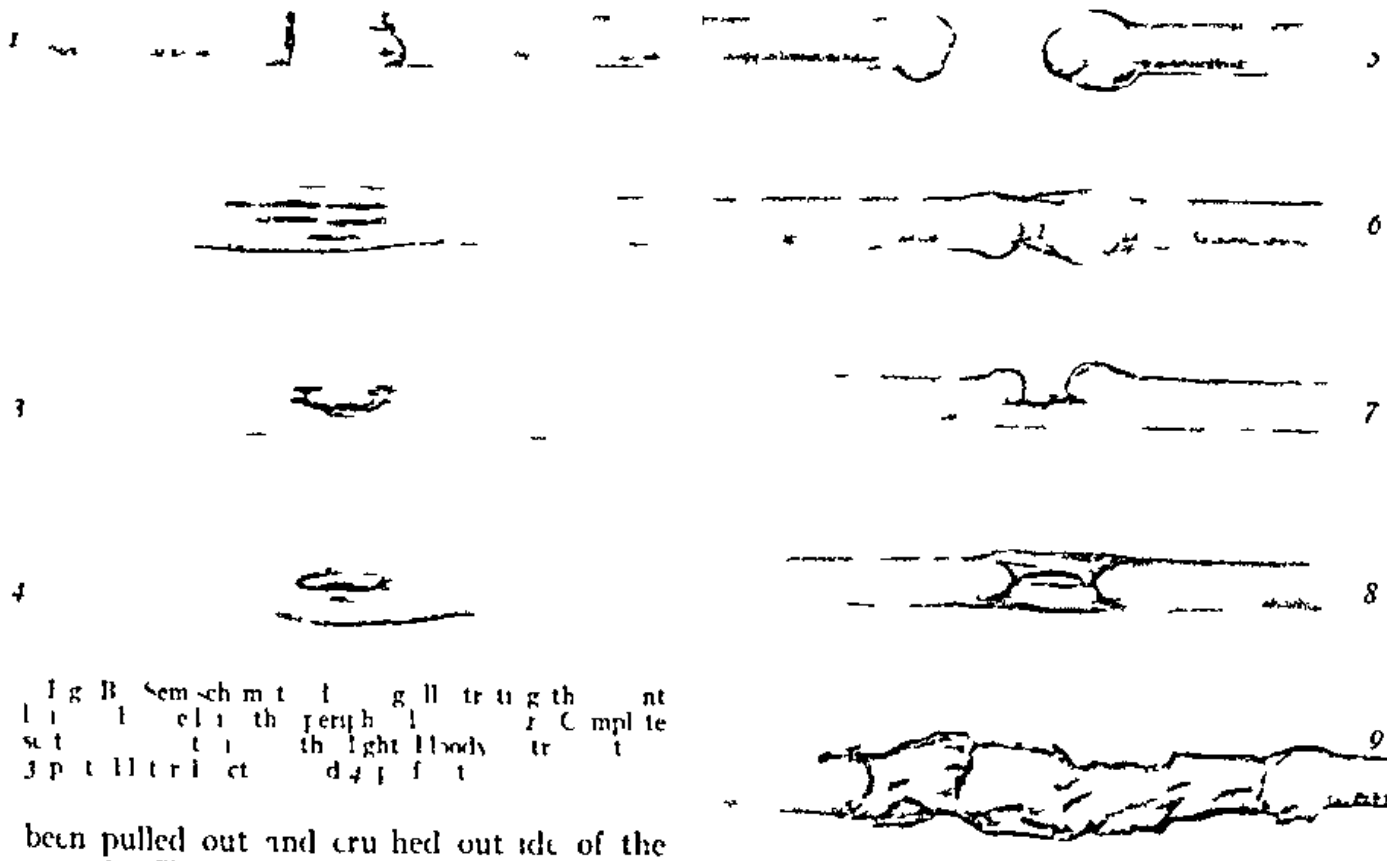


Fig B Semischematic drawing illustrating the principal chronic lesions of the peripheral nerves 1 Complete section with the peripheral portion of the right body trunk 3 partially retracted 4 partial

Fig C Semischematic drawing illustrating the principal chronic lesions of the peripheral nerves 5 Complete section with cicatricial neuroma and peripheral glioma 6 Same lesions with a small zone of interposed cicatricial tissue 7 Lateral notch with small neuroma and small lateral glioma 8 Perforating wound with central neuroma and central glioma 9 Large lesion in the length of cicatricial tissue between the neuroma and glioma

been pulled out and crushed outside of the wound This exterior portion may be soiled and even infected but it must not be sacrificed in any case It should be carefully cleaned with warm salt solution and replaced and sutured if it is possible The difficulty in this case is in finding the end which remains in the tissue Very often it is necessary to explore many centimeters lower than is indicated by the segment of the nerve which is torn

B After the wound is cicatrized one must wait a sufficiently long time to be certain that the wounded nerve has exhausted all its resources and that nature will not regenerate it At least 4 months is necessary to be able to establish a probable prognosis on the repair of the function of the nerve If at the end of that period there are no clinical signs of return of function such as tingling, twitching along the course of the nerve or the reappearance of the contractility of certain muscles which were found paralyzed on the first examination it is necessary to consider surgical intervention If the nerve has been injured and if the phenomena which indicate its reorganization are not in evidence it is necessary to perform a complete section of the neuroma on the central end and the glioma on the peripheral end (see Fig C *5*) Often between the two ends one will find remaining a mass of fibrous tissue equally impermeable to the axis cylinders Many times these neuromata reach the size of a hazel nut and in certain cases it is possible by palpation to determine that they involve the skin If the nerve was not sectioned one can find as we have already seen either a central nodule (see Fig C *6*) made up of the elements of the neuroma and a glioma or a lateral nodule if the nerve was sectioned only in part of its diameter (see Fig C *7*) In the latter case clinical examination will almost always entirely reveal the anomalies in the function of the nerve Perhaps it had not been completely paralyzed but was simply functionless and was accom

panied by sensory disturbances following the wound of the nerve

It should also be mentioned that the lesions of the nerve following crushing injuries of the bones are often equally interesting the nerve is caught in a covering of fibrous cicatricial tissue and even in the bony tissue The lesions which are usually found in these cases are spoken of as *compression of the nerve* and explain the frequent failure in the simple liberation If the compression has been exerted on a small portion of the nerve it will result in the formation of a neuroma above it and a glioma below it (see Fig C 9) The pathology produced in compression of the nerve is similar to that in a lesion of the nerve which is more severe Practically always when one disengages the nerve that was included in a bony callus one has only liberated a nerve which has been physiologically sectioned and one which can recover its function only after resection and suture of the two ends of the nerve In the favorable cases one finds simply a nerve compressed and not destroyed The simple compression may be produced by a foreign body which compresses the nerve against the bone or by a sheath of cicatricial tissue which envelops the nerve without destroying it It is possible in certain cases of simple compression that the simple liberation may be followed by a very rapid cure Usually it is necessary to wait many weeks to establish the return of movements and it is often useful to hasten the convalescence by electric treatment Lastly it is of great importance to recognize a simple compression of a nerve from a physiologic impairment due to trauma There are certain factors which aid in those cases in which the diagnosis is difficult

The following points help in the diagnosis of the difficult cases of simple compression

1 Absence of all nodules in the thickness of the nerve when it is carefully palpated

2 The persistence of the peripheral circulation visible on the surface of the nerve

3 The preservation of the external form of the nerve

In spite of this examination one may be in doubt and should without hesitation perform a resection and suture if one does not want to expose himself to a failure which is nearly certain as I have stated in my statistics I have completely abandoned the electrical examination of the denuded nerve trunk because I have been led into error in many cases because a few of the nerve fibers were sufficient for a regeneration and this was not realized

The technique will be easy to deduce from the general considerations which have preceded I presented it at the French Congress of Surgeons in 1918 and have not modified the details since then I shall consider it as follows

OPERATION AT THE TIME OF INJURY

It is of great importance to explore the wounded nerve as soon as possible after the wound has been received This is particularly true if for one reason or another the wound itself needs an exploration and incision of the wounded parts In these cases the nerve suture will be complicated with little intervention and you will render the wounded man a very great service I have thus performed a certain number of very early interventions and all of these were followed by complete cure with the return of motor and sensory function of the nerves in a lapse of time which was much less than in those cases where the operation was done secondarily Unfortunately because of the scattering of a certain number of wounded it is not possible to give the results with great accuracy However when you consider those which have been followed and the results of the primary sutures one must admit that early suture presented the following advantages

a Ease of investigation and study of the lesion and the subsequent resection made under the best conditions

b A minimum resection because the nerve trunk has not yet had time to invaginate by progressive sclerosis

c The maximum mobility and elasticity of the nerve trunk which will permit approximation or if this is impossible to prepare the nerve for a secondary operation

d Certain gain of 3 or 4 months in the course of the treatment since it is not wise when the operation has been deferred to intervene until 3 or 4 months observation of the wounded has been made

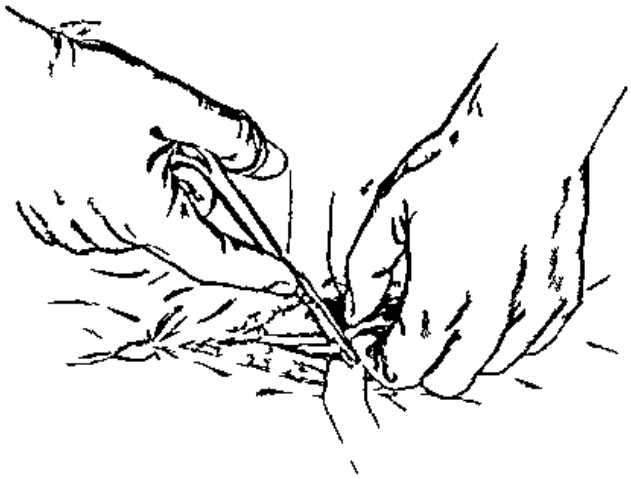


Fig D Drawing illustrating method of procedure and the retraction of the nerve ends with sutures

e Finally assurance that you will not endanger the result if the intervention is not followed by success On the contrary the first intervention and suture of the nerve in a good position provides impediment to retraction so that the secondary operation may be executed with excellent technique The operation includes the exposure of the nerve the surgical treatment of the nerve and the closure of the wound

Exposure of the nerve In the case of a wound by a bullet by shrapnel or in case of simple division by a bayonet wound or a crushing wound of the extremity with comminuted fractures one must first treat the wound itself First it is necessary to make an incision and excise the contused and infected parts so that the nerve will be accessible in the wound by a secondary incision which will not endanger the result If it is a question on the contrary of a section by a bullet wound which is non infected and for which the same intervention is not believed necessary or if all the evidence of any particular wound indicates that it is not necessary to operate as an emergency one should take all the time necessary to examine the case completely Under such circumstances an operation should not be done until one is certain that a complete section has occurred and that there will be no danger of a secondary infection

The surgical treatment of the nerve The nerve must be studied to see whether the lesion is a complete section incomplete section simple contusion or hematoma i e all the lesions

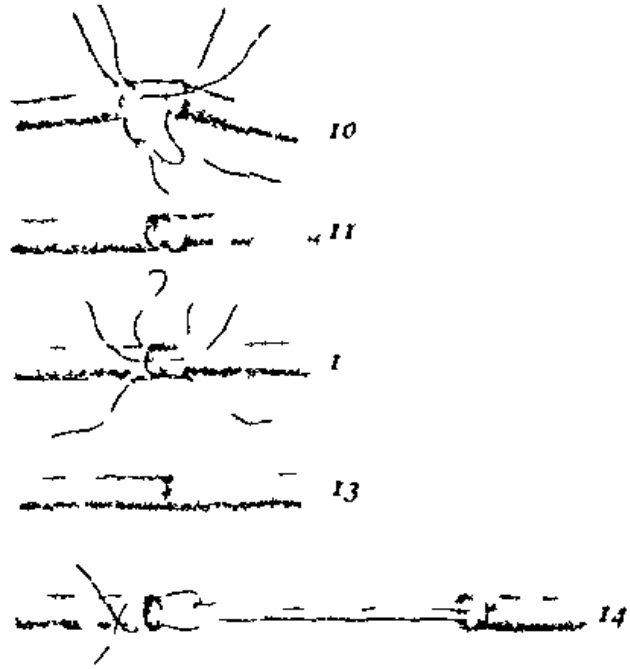


Fig F Semi schematic drawing illustrating the arrangement of the sutures the tubes *10* Placing the three sutures preparatory to holding the neurilemma (the needle goes from without outward) *11* the three posterior sutures are placed *12* placing the three anterior sutures *13* the sutures are complete *14* method of fixation of double grafts of the musculo-cutaneous nerve It shows how the sutures go through the double graft then through the neurilemma and is finally tied on the side of the nerve It is straightly engaged in approximate the two ends of the graft and the cut ends of the nerve

which we have described The difficult point is to recognize the gravity of the damage and from what I have already advanced concerning the doubt of a possible reconstruction of the injured nerve one must not hesitate to intervene and perform a suture when one has ascertained that there is present a complete section or an incomplete section of the nerve a perforation a notch a severe contusion or a diffuse hæmatoma Given such lesions one must perform a resection of the injured portion This resection should be done upon the two liberated ends of the nerve or beginning in the middle of the lesion one must progressively examine the nerve until it shows a healthy appearance The bloody extravasation will sometimes be a guide to find the limits of the lesion not that the resection must extend to the extreme limits of the bloody infiltration but it must be brought near these extreme limits because the nerve tissue of the section must not be gorged with blood

The resection must be done by successive cuts with a very sharp scissors or knife Some have stated that section with a knife is preferable because there is less traumatism and it is neater I have never found for my part any difference between section with the bistoury and section with scissors Since they are more rapid and simple I have had recourse to the scissors and have never noted any difference in the end results At the time of the injury the resection will be always very markedly limited One or 2 centimeters will be sufficient in the great majority of case and we always try to make as limited a resection as is possible and still obtain an apposition under good conditions It is especially in the case of a large crushing wound of the bone with nerve lesions that early intervention is necessary For the moment the wound of the nerve is not often very important although it usually complicates the lesions because of enclosure in the bony callus with resulting compression Under these conditions the nerve repair far from being made easy is hampered by the penetration of the elements of the callus from the fracture into the nerve tissue The latter allows therefore the invasion by a fibrous degeneration ending in a definite sclerosis which considerably augments the extent of the primary lesion It necessitates a nerve resection much more extensive a second operation and often makes the apposition of the two ends more difficult and sometimes impossible

LATE OPERATION

It is usually at the end of the fourth month after injury that this operation will perhaps be tried When the primary wound is completely healed and there is no more doubt that the slightest infection exists one is also able to assure himself that the work of regeneration during this lapse of time has not been effective

Exposure of the nerves In certain cases one may wait upon the cicatrization of the wound and the debridement before attacking the nerve It will be of advantage to excise the cicatricial portion and to liberate the skin completely Oftentimes one is obliged to search for the nerve by a classical incision without taking into consideration the primary wound One takes for the middle of the incision the presumed place of the nerve lesion and incises above and below along a tract of 3 to 4 centimeters It is necessary therefore to use an incision on the average of 8 or 10 centimeter to expose the nerve This incision can be lengthened if it is necessary When the skin is incised the muscles should be retracted as much as possible but not cut in order to preserve intact as far as possible their aponeurotic covering One is able to approach the wound between the muscles and to find the axis cylinders in their descent One is able also to study the extent of the lesion and to re examine the nerve above and below One should wait before exposing the neuroma until its exact relation to the nerve has been recognized It is within the healthy portions of the nerve above and below the lesion that one must carefully study the extent of the lesion Before the nerve is completely liberated one should mark the free surface above and below the lesion The situation of the nutrient arterioles of the nerve should be taken into consideration in making such an identifying mark In certain cases one is able to place a small thread in the neurilemma of the free surface and at a corresponding symmetrical place on the other end of the nerve After the marking one frees the nerve carefully above and below The apposition of the two ends is delayed until the upper and lower portions of the isolated nerve are examined This is done to be sure that thickening of fibrous tissue does not exist

One generally sees the nerve disappear in an indurated and cicatricial mass of tissue sometimes into the callus of a fracture One should determine whether or not the nerve is simply compressed by the injured tissues because in this case a simple dissection will be sufficient for the liberation One will recall that the nerve trunk may be compressed in its thickened and fibrous sheath and when this sheath is gently incised one may observe the nerve actually free itself One should proceed in the same manner if the nerve is engaged in a bony callus by using a gouge and mallet This disengaged and isolated the nerve trunk should be inspected the neuroma and glioma should

be examined One should study that portion of the nerve which is to be resected and fix the points at which the section of the central and peripheral ends are to be made If the lesion appears insignificant and if it is certain that the nerve is not compressed one may be satisfied with performing a simple liberation However if there is any doubt as to whether any small portion of the nerve is compressed stretched or lacerated I believe that it is preferable to perform a resection suture The more one studies the problem of regeneration experience will show that such a procedure gives better and quicker results When resection is decided upon one must bear in mind the possibilities of reconstruction of the sectioned nerve It is necessary to place the member in flexion and exert traction on the two liberated extremities of the nerve so that the two ends can be brought into contact

Major surgical problems In the case of a simple nerve liberation such a procedure constitutes the entire operation If resection is required it must be remembered that the main purpose is to bring together both extremities and then to suture them By preference the section is done with scissors (Fig D) since they give a neat cut and it is easy to recognize the bundles and tubules of nerve The section must be done in the very middle portion of the lesion that is through the fibrous tissue interposed between both ends The proximal part of the neuroma is severed with successive cuttings made near each other these sections should be discontinued only when the nerve tissues exposed to view A suture made before this point is reached would fail on the other hand the greatest latitude must be conserved in order to section the peripheral end On this side section until the nerve tubules start to appear If the nerve is pressed between the tips of the finger they become quickly visible Now if the extremities are apposed easily if one wishes all of the neuroma of the central part may be resected In this case all the conditions required to obtain a good result are obtained and so far this should be considered as a certainty

In the event that it is not possible to approximate both ends the operation is done in two stages The extremities of the nerve may be stretched as far as is possible and after resecting as much of the fibrous tissue as is possible sutures may be made into the scar tissue of either end Such a suture may obtain a lengthening of 3 to 4 centimeters This lengthening is obtained by means of continuous traction on both ends In the second stage resection may be made under favorable conditions The maximum of lengthening which may be obtained by this means is about 4 centimeters After the first stage it may be determined whether it will be necessary to graft in order to suture In this case the resection of both ends is done at once

Suture of the two nerve ends I shall now describe the final suture which is done in one or two stages and the grafting

Suture (Fig E) It must be done in a simple manner using very thin straight or small curved intestinal needles Use very fine silk In making the suture avoid transfixing the nerve the stitches are put through the nerve sheath without touching the nerve itself The main effect of this suture is to approximate the ends and at the same time to prevent any overlapping As this suture is made to hold in slight tension catgut should never be used because it may absorb before the fusion of nerve elements occurs Physiologists have shown that the union of a sutured nerve occurs soon but is not firm until after 4 weeks After this period a sutured nerve cannot be torn off by the normal motions of limbs even if it was sutured in flexion and there is no danger in putting the limb through gradual progressive movements of extension

In order that the different bundles correspond with each other at both ends it is best to establish a landmark Thus one stitch is made in the posterior middle part and the needle perforates the neurilemma about millimeters deep Two more stitches are inserted so that the first will be in the median line Then the first one should be tied (Fig E 10)

Then the nerve is allowed to assume its normal position so that both ends come together (Fig E 11) The suture may be completed with two or three more interrupted sutures (Fig L 1) Anteriorly one can approximate the neurilemma without allowing

nerve fibers to project between the sutures Posteriorly one must exercise more care to obtain a similar result (Fig 1 13) and it is sometimes necessary to place one or two supplementary sutures While it is not absolutely necessary to obtain complete closure of the neurilemma sheath such a condition is ideal The contact of the ends is the vital factor not only at the time of operation but during the period of regeneration To avoid the spreading of the two ends it is useful to maintain some kind of support

If the nerve resection has been rather large and it is impossible to approximate the ends flexion of the forearm or leg may help to obtain approximation Our own observations give the following as the maximum of lengthening which may be obtained

Radial in the arm 6 centimeters

Ulnar in the arm 2 centimeters

Ulnar in the elbow carrying it towards the external condyle with the elbow flexed 5 centimeters

Ulnar at the middle inferior part of forearm 3 centimeters

Median nerve 2 to 5 centimeters

Sciatic trunk at various level 8 to 10 centimeters

External popliteal 4 centimeters

Tibialis posterior at various levels 2 to 4 centimeters

In certain cases to gain contact the following methods are indicated

1 If the nerve lesion in the arm or forearm is accompanied by a fracture a bone resection of three or four centimeters will lengthen the nerve to the same amount I have used this method on several occasions and I never hesitate to perform a bone resection of both bones of the forearm or of the humerus in order to obtain a perfect contact for the three main nerves of the upper limb even in the absence of a fracture There is no comparison between an arm shortened 4 to 5 centimeters with excellent innervation and one without nerve supply but of normal length

2 Under certain conditions nerve sutures may be done in two stages Resections of two or four centimeters in most of the nerves and 5 centimeters in the sciatic prevents primary union by suturing Therefore if in the course of the liberation it appears necessary to make a large resection and it is probable that the ends cannot be approximated the field must be prepared in this way the fibrous tissue must be removed extensively and more so in the central than in the distal end In doing that the axis cylinders have the chance to be free and to pass through the tubes (if there are any) belonging to the distal extremity and can produce regeneration of the nerve thus avoiding further intervention At the second operation the suture may be performed easier and the second resection is done through a plain neuroma of the central end Successive and small sections should be made on the peripheral end until fresh nerve fibers are found Suture is then done in the way described above

As historical facts I mention the following methods

1 Distant suture by means of catgut strands extended as a bridge between the ends It was believed that the nerve tubules could thus pass to the peripheral end

2 Tubular suture of von Lair It was expected that the axis cylinders would go through a rubber tube connecting both ends

3 The neuroplastic method These were illogical No good results have followed these procedures

GRAFTING

The nerve grafts are the last surgical resource to repair large losses of nerve tissue It is the only logical method There are three types of graft

1 Heteroplastic 2 Homoplastic 3 Autoplastic

The heteroplastic graft utilizes nerve tissue from a dead human being Vageotte and Sencert were its authors Physiologic experiments gave satisfactory results and Sencert (1918) performed this operation upon eight person but at this time none have completely recovered It has been too short a time to expect marked improvement Tinel Meyer Jacquemin and myself have used it all of us noticed the beginning of regeneration by the appearance of the sensation of tingling in the distal extremity but after five or six months all signs of progressive regeneration were gone I think it possible to obtain com

plete success in a short graft but I doubt its value in grafts longer than 12 centimeters

The homoplastic graft consists in transplanting a piece of nerve from a wounded person as for instance in an amputation The pieces of nerves may be kept in a refrigerator I have used this method twice but was unsuccessful in both instances In one case the wound became infected the other patient was lost sight of

I have used the autoplastic graft with some results I took portions of the musculocutaneous nerve of the leg I have had a complete recovery with the radial nerve and two very fair results with the ulnar How can we explain these results in the case of the ulnar which is a mixed nerve? Whatever the explanation may be it has been proved true that by means of grafting fragments of the musculocutaneous nerve of the leg as long as 13 centimeters the peripheral nerve has recovered its function

1 *Technique* Dissect the musculocutaneous nerve in a length double that needed in the graft

2 Divide the nerve in two pieces of equal length (Fig E *14*)

3 Transfix these two ribbons with fine silk

4 Suture the graft in such a manner that its ends fit like parts of the nerve

5 Don t tie the sutures too tightly

It is supposed that the axis cylinders pass through the graft and reach the peripheral end It is somewhat difficult to obtain good results

OPERATIONS TO RELIEVE CAUSALGIA

The surgical treatment of this condition by the section of the affected nerve and its succeeding suture is the logical issue of what I have said about nerve sutures Single liberations of the painful nerve or large incisions of its neurilemma have not given satisfactory results I have been using periarterial sympathectomy devised by Leriche with some temporary improvement I therefore decided to cut the nerve about the painful region and suture it With this procedure I have always obtained good results

Technique The nerve is dissected free through a classical incision made over the traumatized region The nerve is carefully examined for microscopic changes Sometimes there is only a firmness of the nerve and its neurilemma appears congested Above these lesions in a proper place the section is performed and both ends are sutured in the way described above The patient experiences great relief at once (when the section has been performed in the proper place)

The purpose in sectioning the nerve is to give it complete rest so that it may be cured of its inflammation (neuritis) This requires a long time (one year at least) but in spite of this delay the causalgia is relieved when the regeneration occurs It may be that the patient may need a second operation as in the case of a patient of mine in whom the ulnar causalgia disappeared soon but recurred in four months After the second operation the recovery was complete

THE TREATMENT OF BRAIN ABSCESS BY UNROOFING AND TEMPORARY HERNIATION OF ABSCESS CAVITY WITH THE AVOIDANCE OF USUAL DRAINAGE METHODS[1]

With Notes on the Management of Hernia Cerebri in General

By JOSEPH E. J. KING, M.S., M.D., New York
[illegible]

All operative procedures heretofore described in the treatment of brain abscess have been based upon three well recognized principles:

1. The drainage of the abscess cavity.
2. Prevention of extension of meningeal infection.
3. Prevention of hernia cerebri.

Various authors have described different methods of exposure *for the purpose of draining* of an abscess cavity. Alson (1) has advised an osteoplastic flap with drainage of the abscess cavity, the drain being brought out through a separate trephine opening *made through the osteoplastic flap*. Ballance (2) has advised the osteoplastic flap for abscesses located in the middle fossa and frontal region. Dowman (3) and Kerr (4) have advocated exploration for and drainage of the abscess cavity *through a small trephine opening in* the skull. However in each of these procedures advocated with a regard to the type of exposure, the intention of the surgeon has been to locate and drain the abscess cavity by means of some kind of *drainage material* and to prevent formation of the brain [illegible].

In the rather large number of fatal cases death usually occurred from rupture of the abscess cavity into the ventricular system, meningitis, or [illegible] of the brain, or death may have resulted from any two [illegible] of these causes.

pus may accumulate in some part of the abscess cavity and fail to be drained. This type of abscess frequently enlarges [illegible] into the ventricle and results fatally.

Numerous drainage materials have been suggested, devised and used, among which are gauze packing, glass tubes, rubber tubes, rubber tissue strips, [illegible] made of wire mesh, [illegible] drains, metal search[illegible], etc. Although [illegible] lated cases of recovery have been reported with practically every type of drainage [illegible] ated, no author has reported any [illegible] series of cases of recovery by any type [illegible] *drainage* [illegible] claim a low mortality rate. In [illegible] words no type of drain really drains [illegible] in the sense that a complete [illegible] manent obliteration [illegible] *take place following* [illegible] recovery.

It has frequently been [illegible] operators that following [illegible] abscess cavity which has [illegible] been [illegible] position [illegible] condition gradually [illegible] whether [illegible] wall [illegible] expression [illegible] tubes [illegible]

[illegible]

THE CERTAIN [illegible] DANGER [illegible] DRAINAGE METHODS

Although numerous isolated cases of recovery have been reported [illegible] [illegible]

[illegible]

rather [illegible]

Drainage may be [illegible] place [illegible]

[illegible]

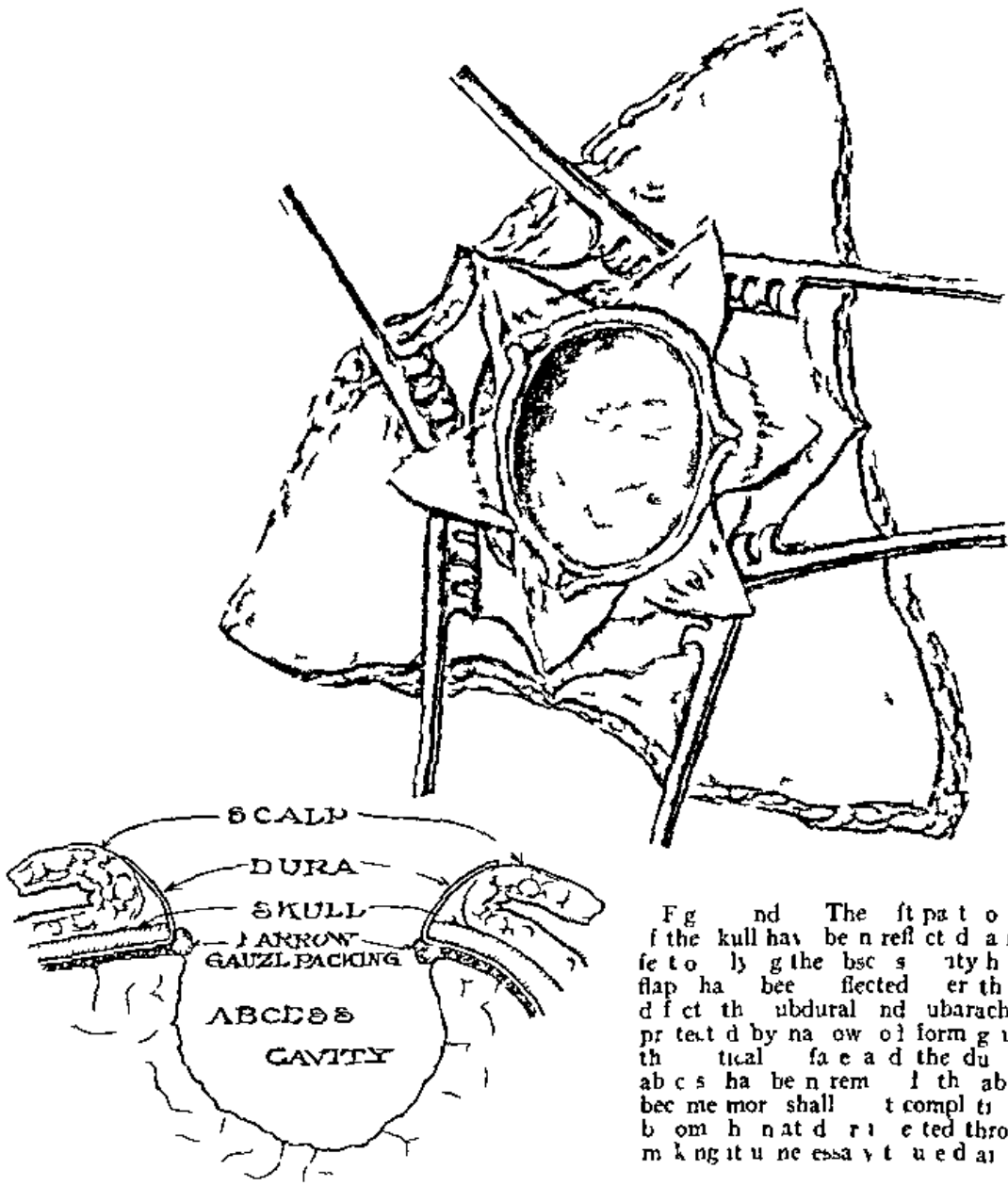


Fig nd The ft pa t o rly g th ute table f the kull hav be n refl ct d a rather l rg cra l d fe t o ly g the bsc s ity h s bee made the du al flap ha bee flected er th b v ma g n f the d f ct th ubdural nd ubarach o d pace ha e been pr tect d by na ow o l form g u e i si uat d between th tical fa e a d the du The ro f of the ab c s ha be n rem l th ab ce s c ity wh ch has bec me mor shall t compl ti of op rat o can ow b om h n at d r i e ted through th cranial def ct m k ng it u ne essa y t u e d ai g material

found at autopsy that drains have not been replaced in the sense that they follow the original tract but are found to be inserted into the brain tissue outside of the tract Early removal of drains and attempt to replace a dislodged drain have undoubtedly been frequently followed by fatal results Even at the time of operation after the abscess cavity has been partially evacuated it has been observed that the attempt to insert a drain into the abscess cavity has failed and at autopsy we find that the drain is in the brain tissue outside of the cavity This is especially likely to occur in encapsulated abscesses in which partial evacuation of the contents of the cavity is followed by a partial collapse of the cavity and the cavity becomes lost so to speak Death may also follow pressure of tubes or the displacement of a dressing Fatal results have also followed perforation into the ventricle by drainage tubes in attempts to replace a drain

REASONS FOR DISCARDING USUAL DRAINAGE METHODS

In the past I have used various types of drainage material such as rubber tubes rubber dam and rubber tissue and have seen the cases terminate fatally although improvement may have taken place immediately after



Fig 3 Case 1 M L Temporosph l l l be l sces f ft h wi g ap r imate positi a d r l t e siz of th enc ps l ted bsces There was a d f t n ht f cial pares



l 4 Case 1 M I T mporosph l l l be b-cess left how g th perati era ial d fect th h wh h her ratu n of th absces ca ty occu red

the operation and progressive improvement continued for several days or weeks How ever in 1920 I operated upon a case of encapsulated temporosphenoidal lobe abscess of the left side following a simple mastoidectomy Exposure of an area of dura about the size of a half dollar piece was made The capsule of the abscess cavity was covered with about ½ inch thickness of brain cortex The cavity was entered and exploration irrigation and cleansing of the cavity were accomplished through a crucial incision in the dura and a tract made through the cortex and capsule with an artery clamp After the cavity had been thoroughly irrigated with Dakin s solution we inserted drainage materials through the crucial incision consisting of the following a rubber tube about 2 inches long and about ½ inch in diameter with a lateral opening at the distal end was placed against the floor of the abscess cavity and four narrow gauze packing strips wet in Dakin s solution were placed about the tube Irrigation of the larger tube was done every 2 hours by placing a small rubber tube in the lumen of the larger tube without removal of the drain

After several days it was observed that herniation of the brain was taking place The tube was displaced outward with the abscess cavity and about 3 weeks after operation the hernia had protruded to such an extent with a resulting shallowing of the abscess cavity that the tube had to be considerably shortened A few days later the entire remaining piece of the drainage tube was removed for the reason that the abscess cavity had become so shallow that it would not retain the tube In the meanwhile the operative site including the brain hernia was irrigated with Dakin s solution With this treatment the hernia began to recede and after 2 months following the operation the hernia had completely receded and had become covered with epithelium except for a central area about the size of a quarter One week later the site of the hernia was completely covered with epithelium The patient was discharged from the hospital with complete recovery and has remained well up to the present time

Comment Although it was the intention of the operator to drain the abscess cavity and prevent herniation of the brain hernia cerebri developed with extrusion of the drainage tube In spite of the herniation which occurred with no other treatment than dakinization of the wound and dressings which prevented pressure on the hernia the hernia receded and the wound was completely healed within 2 months and 1 week following the date of operation

About 3 weeks after operation upon the above mentioned case I operated on another temporo sphenoidal lobe abscess of the left side practically identical with the case described above In this instance I located the abscess cavity entered and evacuated its contents irrigated the cavity with Dakin s solution and instituted the same type of drainage as in the previously described case In this instance I



Fig. 5. Case VI. Temporosphenoidal abscess. Left: Photograph of patient about 3 years after operation.

was able to drain the abscess through a much smaller opening in the skull so that herniation of the brain did not take place. The patient recovered from a semicomatose condition to the point where he was able to be up and about the ward and about the hospital grounds. Secondary pockets formed on two occasions after the patient had been up and walking about, each time necessitating his return to bed with a return of the stuporous semicomatose condition. In each instance the cavity was again entered and drained. Following the evacuation of the first secondary pocket or abscess the patient's general condition again improved and he was up and walking about after which another secondary abscess formed and drainage was again instituted. Although the patient improved to a certain extent following the drainage of the second secondary abscess which developed he never recovered to the extent observed following the drainage of the original abscess and the first secondary abscess. The infection finally spread and the patient died as a result of rupture of the abscess into the ventricle.

Several months later I operated upon a frontal lobe abscess and instituted drainage which allowed the patient to recover from a semicomatose condition to the point where he was up and about the ward when a secondary abscess occurred with rupture into the lateral ventricle terminating in death.

After having had this experience I began to consider closely the questions of drainage and the desirability or undesirability of temporary herniation of the brain. In the first

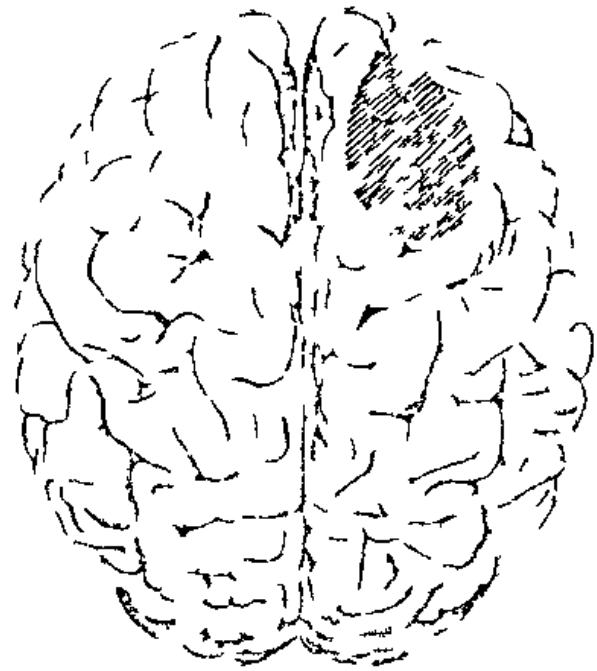


Fig. 6. Case VII. Multiple abscesses right showing the appearance and relative size of the resultant abscesses. There was a definite left-sided hemiparesis.

case evacuation of the abscess cavity had been accomplished through a rather large trephine opening through which a hernia cerebri subsequently occurred. The patient recovered. In the other two cases briefly described similar drainage had been instituted through smaller trephine opening in which herniation did not occur. Both patients died.

It is also well known that during the late war a number of deaths were prevented in cases in which there was gross cranial and intracranial injury by removal of a large mosaic of fragments of skull and considerable amount of damaged brain tissue with the result that subsequent herniation of the brain occurred. A great number of these patients recovered and came under the observation of the chiefs of the neurosurgical services here in hospital in the United States where the cranial defects were repaired. We have had cases of compound depressed fractures of the skull in Bellevue Hospital in which the wounds were infected suppuration occurred and hernia cerebri developed. The hernia receded with no other treatment than protective dressings and cicatrization of the wound.

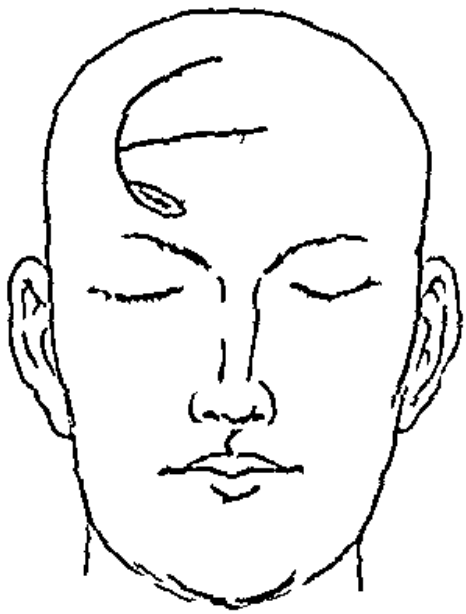


Fig 7 Case T W Frontal lobe abscess right seco d stage I ll infected depressed fracture f skull in l g right frontal s u Th i on utl ing th flap f r exposure f th outer table of th kull a e i dicated by the h y ll k l nes Th curved l ci on cl les at its l r e i emity the *nfected scalp wound wh h is e c ed Th approximate ize f the al shaped ra al defect t be ma le f ind ated by th d tted l nes

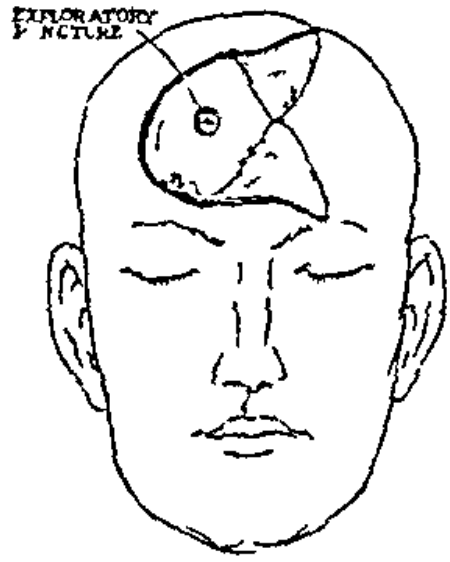


Fig 8 Case 2 T W Frontal lobe abscess ight The sk tch h s th site of th tr phi pe ng mad f th p rpose of expl rat ry pu ct re

This question then arose in my mind Why not at the time of the original operation provide a rather large trephine opening or cranial defect directly over the site of the abscess pack off the subdural and subarachnoid paces to prevent extension of infection unroof the ab ce s cavity by completely removing the overlying brain substance completely empty the remaining portion of the abscess cavity allow temporary herniation of the brain to take place through the cranial defect produced so that no drainage with drainage material will be required and let the subsequent treatment consist of irrigation of the area with Dakin s solution and prevention of trauma to and early compression of the hernia by protective dres ing which would be followed by rece ion of the hernia and epithelialization of the wound? After prolonged consideration I came to the conclusion that this was the proper procedure and that cases which should come under my observation thereafter would be treated in such manner

Three patients with brain abscess con ecutively operated upon by me in this manner recovered are well today and are self supporting Upon observations made in these three cases I have made conclusions as set forth in this paper The etiology pathology symptomatology and diagno i of brain abscess will not be discussed as the literature i replete with papers on these phases of the subject

TECHNIQUE OF OPERATION

Anaesthesia Local anaesthesia with novocain solution 1 per cent and ½ per cent with suprarenin is the anaesthesia of choice I have seen no ill effects in the patients operated upon from the use of this solution In mo t cases the patient is already drowsy stuporous or semicomato e

The solution is injected in a circular direction around the site where the cranial defect is to be created The diameter of the field is about 4 inches This method makes it possible to inject the field rapidly and at the same time obviates entering an infected field thus spreading the infection in case an infected wound is present Not more than 100 to 125 cubic centimeters of the solution will be required Dunn s apparatus for the injection of the olution has proved to be satisfactory

Incision The preferred incision is either three limbed or crucial so that the point of apposition of the apices of the scalp flaps will coincide with the site of the trephine opening (Fig 1) If a wound be present its situation

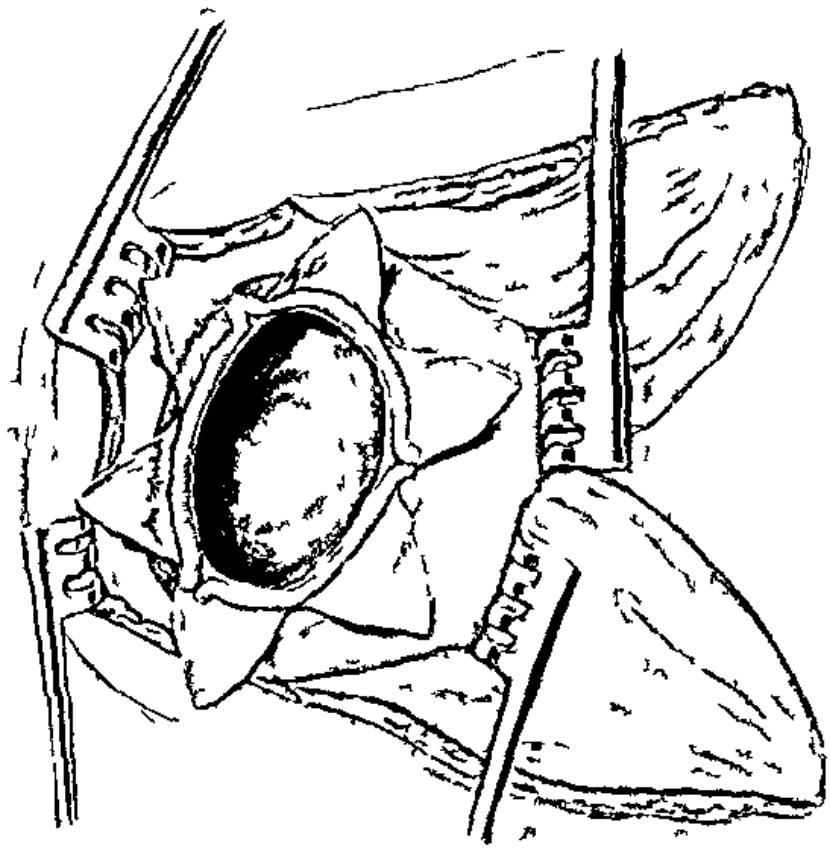


Fig 9 Case 1 W Frontal lobe abscess right Illustration shows the operative field as it appeared at completion of operation

and direction may require the making of two or four flaps instead of three (Figs 7 8 9) The incision is carried through to the outer table of the skull and the flaps consisting of the scalp subcutaneous tissue musculature and pericranium are elevated reflected and held with self retaining cranial retractors (Figs 9 and 14) The apices of the flaps are turned outward and sutured loosely to the flaps so as to prevent their becoming adherent too early to the surface of the hernia which will form and to prevent the apices of the flaps from turning under and becoming adherent to the undersurface of the flaps These retractors afford adequate exposure and prevent hæmorrhage from the margins of the flaps by traction and pressure so that no artery clamps will be needed for this purpose The exposure of the skull is therefore more rapid and is accompanied by practically no hæmorrhage If an infected wound of the soft parts is present this is excised along one limb of the operative incision A trephine opening is made in the central portion of the exposed outer table of the skull with a Hudson bone drill bits A and B being used A small incision about ¼ inch long is then made in the dura so as to allow of exploration with a blunt hollow needle or cannula (Fig 9) When the abscess cavity is entered by the needle and pus is obtained a small amount of pus is removed for bacteriological examination the location of the abscess is indicated the needle is withdrawn and the trephine opening is enlarged with rongeurs until it is about the size of a silver dollar or larger It is enlarged in a direction to correspond with and overlie the abscess cavity If the abscess is located directly beneath the trephine opening enlargement of the cranial defect will be concentric with the trephine opening If the abscess cavity is located more anterior or more posterior or inferior or more superior then the opening is enlarged in the direction indicated so that the original trephine opening may be in the periphery of the cranial

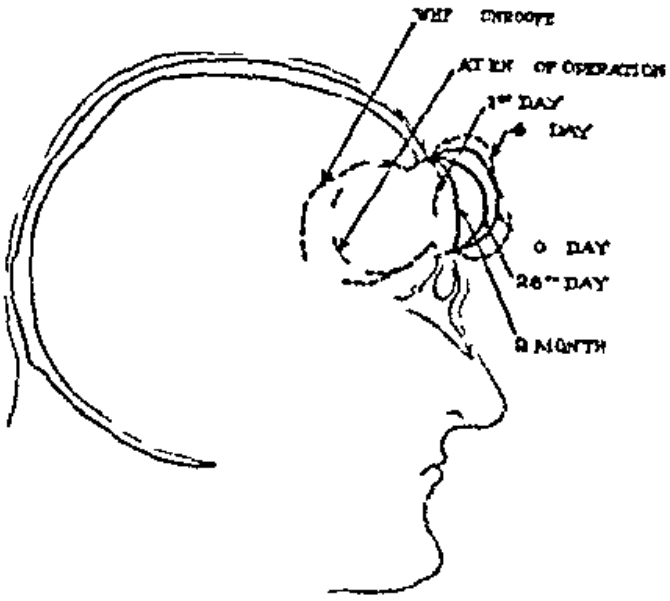


Fig. 10. Case 2. T. W. Frontal lobe abscess. In this diagram is represented the approximate relative size of the abscess cavity when the roof is at the first operation. Its progress from the recess of the hernia.

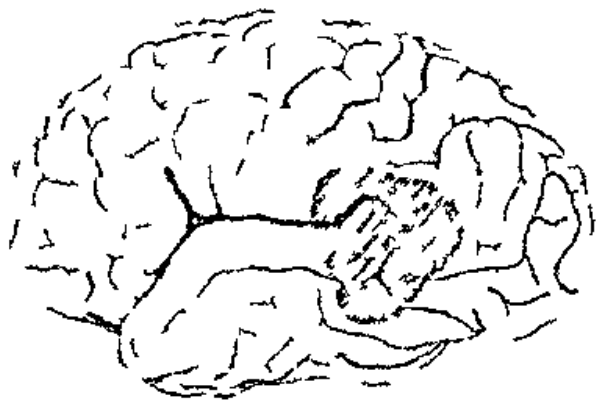


Fig. 11. Case 3. C. D. Temporosphenoidal lobe abscess. Left hemisphere showing the approximate position and relative size of the encapsulated abscess with extension to the parietal, occipital, lobe and temporosphenoidal lobe. There was definite right facial paresis.

defect created. The dura is incised in a stellate fashion creating six pennant shaped flaps which are reflected over the bony margin of the cranial defect and sutured with fine plain catgut to the underlying surface of the scalp flaps. Small narrow strips of iodoform gauze (three pieces) are then lightly packed or insinuated beneath the margin of the circular defect created in the dura so as to wall off the subdural and subarachnoid spaces and prevent extension of infection into these spaces. (Three short pieces of gauze are more easily removed than one long piece.) The blunt exploring hollow needle or cannula is again inserted into the abscess cavity so as again to locate the cavity definitely after which a ½ inch incision is made with a sharp Bard Parker knife (blade No. 11) through the brain tissue (and capsule if one be present) overlying the cavity. A soft rubber catheter about No. 18 F. with a 20 cubic centimeter Luer syringe attached is inserted into the incision and most of the contents of the cavity are carefully withdrawn to prevent the contents of the abscess from running over and oiling the field of operation.

The incision in the cortex or roof of the abscess is carried to a point on the margin of the cavity, then thence around it in a circular manner so that the entire roof of the cavity is removed completely, unroofing the cavity. It is essential that a short knife should be used for this purpose. When normal brain tissue is cut one anticipates a considerable amount of bleeding. But only slight oozing occurs when the brain tissue overlying an abscess cavity is cut and removed.

As soon as the abscess is evacuated the patient's condition improves. The pulse which in most cases is low, now rises to between 90 and 110. Respiration and the general condition improve so that he is less stuporous, is more susceptible to the external influences, oftentimes is able to talk and answer questions and may become restless and may have to be restrained on the table.

The cortical margin about the abscess cavity will fall away from the dura unless adhesions have already taken place. If adhesions are present they should not be separated as their presence will be of value in the prevention of spreading of infection into the subdural and subarachnoid spaces. In fact these spaces may be completely shut off by the adhesion. The cavity is then thoroughly irrigated with Dakin solution and gently sponged or wiped out with cotton pledgets completely to remove the contents of the cavity. No attempt is made to remove the capsule if one is present. In fact a capsule tends to prevent too marked herniation of the brain.

After the roof of the abscess cavity has been removed it will be observed that the floor of

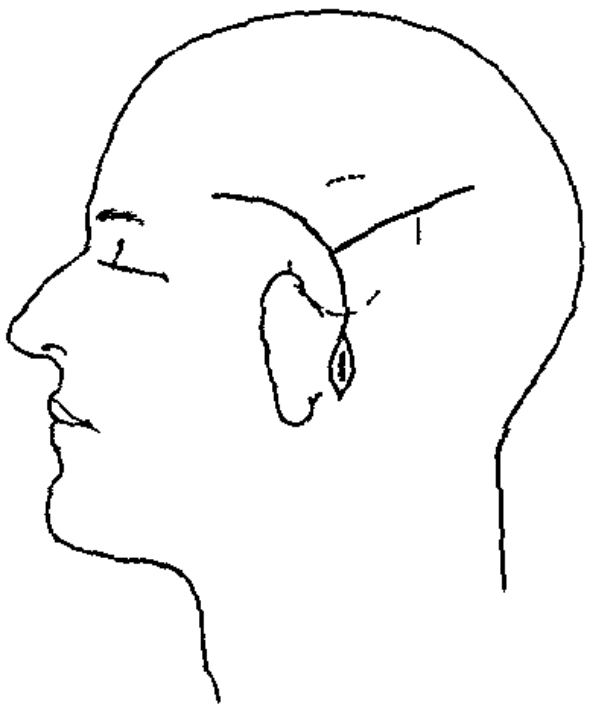


Fig Case 3 C D T mporosph n dal l be b ess l ft sec lary t ma t d t th mpl ma t dect my Th n n tl g th flap f e po u ol tl out t ble f th k ll a d ted by th h a bl ck l e Th d tted l nes sh w th ppr imat l t e iz f th c m l d f ct t be r ted



Fig 13 Ca 3 C D T mpo o ph n idal lobe b ce left sho ing the perat e cranial def ct th o gh wh h h rn at n ot the b ces cav ty occur d

the abscess cavity becomes less concave flat tens out and tend to rise somewhat into the operative field thus diminishing the depth of the remaining portion of the ab cess cavity (Figs 10 and 15)

No drainage tubes or other drainage materials are inserted into this remaining portion of the abscess cavity A fenestrated rubber dam is placed over the cavity its margins coinciding with the operative field over which small pieces of gauze wet in Dakin s solution are placed so that the rubber dam dimples somewhat into the cavity The original three pieces of iodoform gauze which were placed around the dural opening are not removed or changed These pieces during the procedure adapt themselves to the margin of the sub dural space and tend to prevent leakage into the subdural and ubarachroid paces better than if they were changed and new on s introduced

The intention of the procedure is first to remove the contents of the abscess cavity and second to remove the roof of the cavity so as to allow the remaining portion of the cavity to herniate outward through a cranial defect which is intentionally placed directly over the absces The rubber dam is used to protect the surface of the after forming brain hernia The rubber dam offers better protection than does gauze or any other substance which might be used in that there is no trauma to the hernia in its removal and at the same time when it is used it is possible to dakinize the hernia on account of its being fenestrated The rubber dam is covered with a piece of gauz wet in Dakin s solution and three per forated Dakin tube are placed over the gauze so that the entire area may be kept thoroughly wet with Dakin solution and a copious wet Dakin gauze dressing con isting of flats and headroll is applied

And furthermore both ears are covered with several layers of vaseline gauze to pre vent irritation by the solution If the abscess is frontal in location it is advisable to cover one or both eyes with vaseline gauze and include them in the dressing Vaseline gauze is not applied to the scalp about the wound until the first dressing on the following day as the scalp will withstand dakinization for 4 hours without irritation The entire dress ing is held in place with wet gauze bandage

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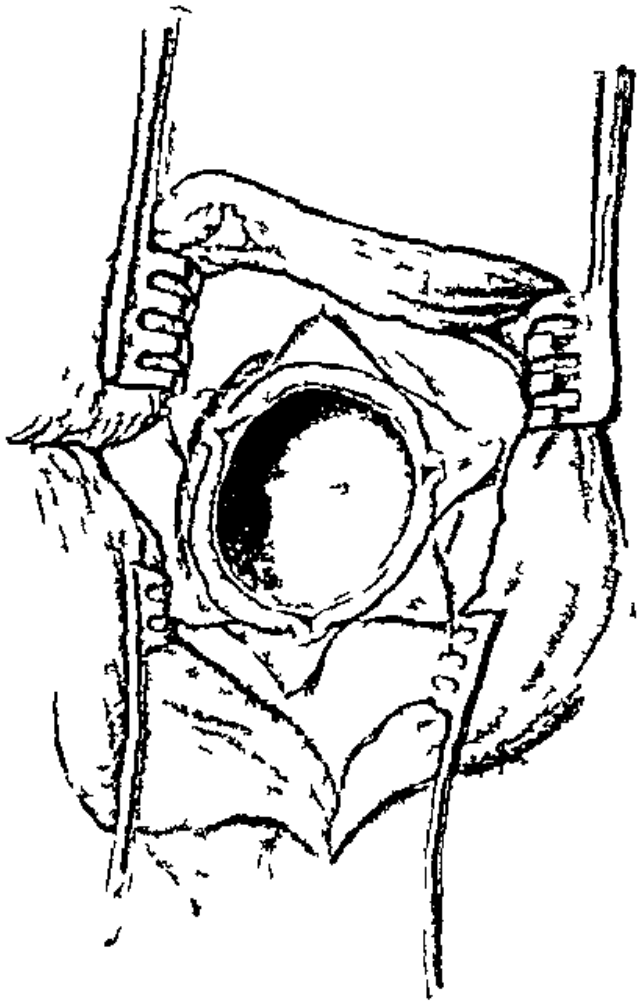


Fig. 4. Case 3. C. D. Temporosphenoidal lobe abscess, left. Illustration shows the operative field at the completion of operation.

including the head and the lower jaw, to prevent removal or displacement of the dressings by the patient.

This procedure is equally applicable in the treatment of abscesses whether located in the frontal or temporosphenoidal lobes (with or without extension into the parietal or occipital lobes) or cerebellar regions, or for those abscesses which are secondary to an old infected compound fracture or osteomyelitis of the skull. These groups form the greater majority of all brain abscesses. Likewise single metastatic abscesses which are comparatively rare are amenable to this type of operation. For multiple metastatic abscesses no surgical procedure can be expected to offer relief. If the abscess is located in the parietal lobe (which is unusual) necessitating a partial removal of

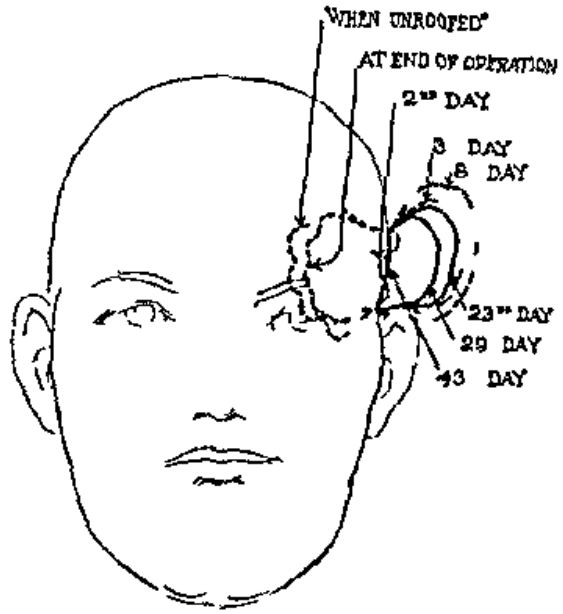


Fig. 5. Case 3. C. D. Temporosphenoidal lobe abscess, left. Schematic representation of the approximate relative size of the abscess cavity when unroofed at the completion of operation and during the progressive obliteration of the abscess cavity as represented by the various days.

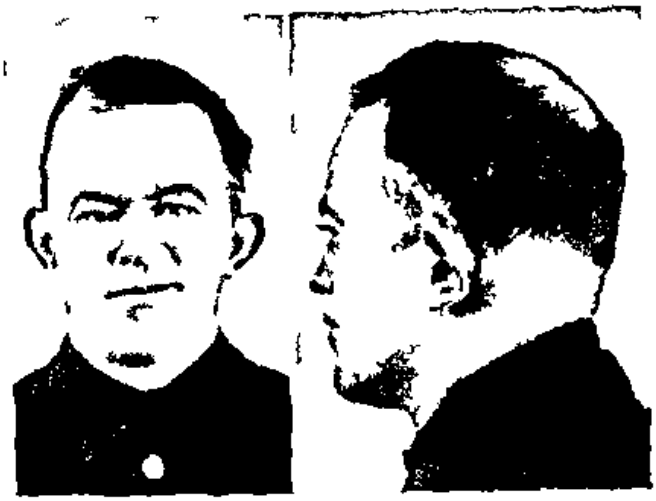
the cortex, a monoplegia or even a hemiplegia is to be preferred to a fatal result. In those cases of cerebellar abscess where the abscess is situated on the anterior surface of the cerebellum and the lateral sinus is involved, the approach described by Eagleton (3), with ligation and division of the lateral sinus, probably will give best results.

In the small remaining group of cases where the abscess is basilar in position and no opportunity is offered for removing the wall of the abscess to allow herniation, the two stage procedure described by Dowman (2) is probably the operation of choice if the abscess can be located.

In recapitulation, the procedure described in this paper is applicable in all cases of brain abscess in which the roof of the abscess can be removed and the abscess cavity can herniate through the cranial defect. Fortunately these cases are most frequently met with and comprise the vast majority of all brain abscesses.

POSTOPERATIVE TREATMENT

The after care of the patient with attention to details is most important and should be carried out by the operator himself or by



Figs 16 and 17 Case 3 C D T mporosphenoidal lobe bsc s left Ph t g phs f pat e t made o \o mbe 1 19 3 about month after per t on

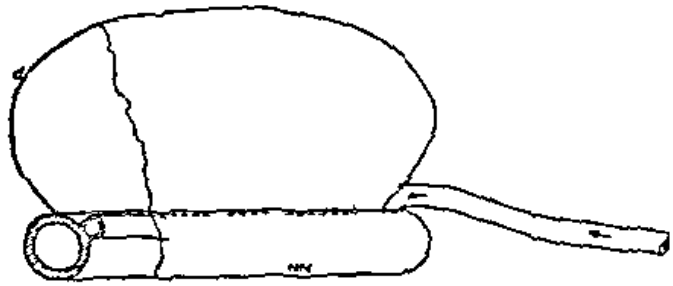


Fig 18 Apparatus de igned for i rig tion of perative f eld with Dakin solut on and prot ct n of bra n hernia a inflow tube b circul r perforated Dakin tub c pn u matic rubber tube ring which is fast ned to head to pre nt di placement d perf rated rubber cap to e cl se hern a

an assistant who thoroughly understands the postoperative care The patient should be dres ed daily for a prolonged period of time The cardinal points in the after care of the patient which will result in recovery are

1 Allowing of temporary herniation of the brain carrying with it the remaining portion of the abscess cavity

2 Combating of infection by the use of Dakin s solution

3 Prevention of trauma to the brain hernia during the period of combating infection and the subsequent recession of the hernia

4 Prevention of overdistention of the ven tricular system by means of lumbar puncture if indicated

5 Strapping of the wound with adhesive strips after the slight necrosis on the surface of the hernia has ceased and the surface of the hernia has become covered with healthy gran ulations followed by epithelialization and re cession of the hernia

Dressings For several weeks the dressings should be done daily beginning on the first day after operation Dakinization of the wound is commenced immediately after the patient is returned to bed from the operating table the instillation being made every hour

Vaseline gauze should completely cover the scalp for protection from Dakin s solution and be removed and replaced at each dressing

At the first dressing all of the dressings should be removed with the exception of the rubber dam over the defect (or the rubber protecting apparatus if used) and the three small pieces of iodoform gauze which have been placed about the margin of the defect to protect the subdural and subarachnoid spaces At this time i e 4 hours after opera tion it will be observed that the abscess cavity has become somewhat herniated outward has become much more shallow and may have reached the level of the inner table of the skull If not this level will have been reached by the second or third day (Figs 10 and 15) A dressing similar to the one applied on the operating table is again applied and the scalp covered with vaseline gauze

This same procedure is repeated each day until about the sixth day when the hernia of the brain will have passed out of the cranial defect and the abscess cavity will have be come everted or turned inside out so to speak so that the concave floor of the abscess cavity has now become the convex surface of the hernia The hernia is *smaller in cases in* which a capsule is present than in those cases of non-encapsulated abscess At this time the hernia will have assumed a mushroom shape *overlapping the* small iodoform gauze pack ings about the margin of the defect These should at this time be carefully removed so as not to traumatize the hernia If the gauze packing is not re inserted between the scalp flaps and base *of the hernia* the scalp flaps will become attached to the lateral surfaces of the hernia which might result in the ad *herence of flaps to th* hernia and in the form ing of small pockets at the base of the flaps in the space between the base of the flaps and the base of the hernia In order to prevent

such an occurrence it is considered advisable to pack lightly strips of gauze wet in Dakin s solution between the scalp flaps and the brain hernia so as to allow the flaps to first become attached to the hernia at the base Throughout successive dressings these light gauze strip packings are inserted to a lesser depth than on the preceding day thus allowing the scalp flaps to become gradually attached to the hernia from the base upward When the space between the base of the flaps and the base of the hernia has been obliterated the loose sutures which have held the apices of the flaps in an everted position are removed and the flaps allowed to become adherent throughout to the lateral surface of the hernia Care should be taken that the apices of the flaps do not roll inward upon the flap and become adherent to the undersurface of the flap or that the margins themselves do not roll in If so the hairs from the scalp will grow outward and downward against the surface of the brain hernia irritate the surface of the hernia prolong infection and delay epithelialization at this area The holding of the apices of the flaps in an everted position for several days will prevent this occurrence

The hernia may become of considerable size from the size of a small lemon to that of a small orange that is a mass from about 1½ inches in diameter to that of 3 or more inches in diameter and protrude above the level of the scalp for a distance of 1 to 2 inches The hernia should not be cut away neither should it be compressed at this time To prevent compression if the apparatus suggested for this purpose is not used a ring made of cotton wrapped with gauze (such as is placed about a patient s heel to prevent a pressure sore) is placed about the hernia and strapped to the head to prevent displacement of the ring The hernia is kept protected with a rubber dam or apparatus and the entire area is kept thoroughly irrigated with Dakin s solution In other words after the hernia has formed it is necessary to (1) protect the hernia from pressure and trauma (2) prevent overherniation by lumbar puncture (3) keep the area thoroughly irrigated with Dakin s solution (4) keep the patient quiet in bed during the first 3 or 4 weeks while the hernia is at its maximum size and to prohibit physical exertion Bowels should move daily

To prevent excessive herniation of the brain after the abscess cavity has become everted lumbar puncture with removal of 10 to 25 cubic centimeters of fluid from time to time should be done after the first weeks have passed By this time the area about the defect has become well walled off and the likelihood of spreading of infection in the meninges will have passed The size of the hernia will immediately decrease during the lumbar puncture while the fluid is being withdrawn The herniating mass instead of being tense will become soft flabby somewhat flattened out and may even become depressed in its central portion In case of temporosphenoidal lobe abscess where the herniating mass consists of brain tissue for the most part the recession of the hernia following lumbar puncture will not be as great as in the case of a frontal lobe abscess where the herniating brain substance is thinner and the surface of the anterior horn of the lateral ventricle is nearer the surface of the brain hernia In such a case that is a frontal lobe abscess the hernia recedes entirely within the cranial cavity and forms a depression In such cases the amount of fluid removed by lumbar puncture should be less so as not to create a negative pressure within the ventricle and thus bring about the danger of possible rupture into the ventricle from without The intention should be to remove only enough cerebrospinal fluid to lessen the intracranial pressure sufficiently to do away with the possibility of rupture of the ventricle from within outward through the hernia from marked increase of intracranial pressure Lumbar puncture should not be done in the first few days following the operation for fear of extension of infection

In the cases observed there were slight areas of superficial sloughing of the hernia These areas of sloughing were on the surface and were not greater than one sixteenth to one-eighth inch in depth It has not been observed that they have been deep seated or tended to extend into the depth of the hernia but have always been limited to thin superficial sloughing These superficial sloughs should not be

removed until after they have become completely loosened (except that the margin which has already become loosened should be clipped away with scissors) i e no attempt should be made to dissect the slough away from the brain tissue If so slight bleeding will occur with the possibility of extension of infection into the hernia and a repetition of the sloughing at this site The slough which has been observed has been chiefly that of the wall of the everted abscess cavity itself and the cut margin of brain substance about the original abscess cavity made by the knife in unroofing the cavity Gross sloughing of the hernia itself has not taken place

After about 3 or 4 weeks the surface of the hernia will become covered with healthy red granulation tissue which will give a greater resistance to the surface of the hernia The surface will become somewhat fibrosed and will not increase suddenly in size with coughing and sneezing as it does in the earlier stages before fibrosis or partial cicatrization has taken place The hernia will also begin to diminish in size becoming less and less from day to day It will be observed that epithelium has begun to grow out over the surface of the hernia extending from the margin of the scalp flaps At this stage the surface of the hernia should be covered with strips of perforated adhesive plaster exerting slight pressure To fix the adhesive so that it will not be loosened by the Dakin s solution a strip of adhesive about 2 inches wide should be placed around the head so that the ends come to within about 3 inches of either side of the site of the hernia To this strip of adhesive the several smaller pieces of adhesive covering the hernia can be fastened and they will not be loosened by the Dakin s solution These strips should be removed daily during the first week or two of strapping of the hernia on account of the secretion which accumulates about the strips A gauze dressing wet in Dakin s solution should be applied over these strips and it should be kept wet with Dakin s solution and a syringe from without every 2 or 3 hours At this stage it will no longer be necessary to use the Dakin tubes The epithelium grow rather rapidly beneath the adhesive strip so that finally only a small granulating surface remains after the area has been strapped for about 2 weeks The patient ordinarily will be up and about the ward by the time the strapping is commenced The small granulating area in the center of what was the hernia finally becomes completely covered with epithelium leaving a healthy non hair bearing scar usually somewhat triangular or crucial in shape this being the space between the margins of the retracted scalp flaps

The average time which will be required from the time of operation until the hernia has completely receded and the granulating surface has become covered with epithelium is about 2½ to 3 months The level of the site at which the hernia occurred has now become flattened the hernia is completely subsided or the area may even be slightly depressed The case will then show the typical physical signs of the usual cranial defect i e there will be present pulsation corresponding to the heart beat impulse on coughing or sneezing a tendency to slight herniation when the patient leans toward the side on which the cranial defect is situated and a slight depression when the patient leans in the opposite direction

Hernia cerebri in general The treatment described above applies to hernia cerebri in general We have demonstrated this to our satisfaction in the last 2 years in Bellevue Hospital All cases which I have seen treated in this manner at this hospital have recovered

LATER OPERATIVE PROCEDURES

Scalp plastic After a period of 1 year or more following complete healing of the wound a scalp plastic with excision of the non hair bearing scar and approximation of hair bearing scalp edges is advisable for the following reasons in certain cases

1 Elimination of the rather thin scar overlying the brain substance which might be more easily traumatized than true scalp thus resulting in a secondary infection

2 Preparation of the site for cranioplasty or repair of the cranial defect at a much later date in case this is desired

3 Protection

4 Cosmetic reasons

The calp plastic however should be deferred for a period of 1 year to 14 months so as to avoid the possibility of latent infection

Cranioplasty After a period of about 1½ to 2 years following the original operation the cranial defect can be repaired according to the method used by us in the neurosurgical services in the late war and also in the hospitals in civil practice This subject will not be discussed as it was fully covered in a previous paper (5)

REPORT OF CASES[1]

CASE 1 M I New York Eye and Ear Infirmary No 28318 Russian Hebrew age 28 occupation cutter of men's clothes Service Dr John McCombe Admitted to hospital July 5 1920

Four weeks before admission patient had severe pain in left ear On following day the ear drum was punctured and drained for about 10 days Drainage suddenly ceased following which there was pain behind the ear in region of mastoid process On day previous to entering hospital there was pain and swelling behind left ear

July 1920 simple mastoidectomy left

July 22 1920 *operation* For brain abscess temporosphenoidal lobe left The abscess was encapsulated and contained thick yellow pus—streptococcus The cortex overlying the abscess cavity was about 1 2 centimeters thick

A large opening was made into abscess cavity and a short thick rubber drainage tube inserted This was held with four gauze packings Hemostasis of abscess cavity occurred and was complete on about thirteenth day with eversion of abscess cavity Treatment consisted of irrigation with Dakin solution Thirty days following operation the hernia had markedly receded Fifty seven days after operation hernia had completely receded with no treatment other than keeping the area clean with Dakin's solution Sixty days after operation the wound was completely healed Highest temperature 101 2 degrees on second day

In this case herniation of brain was not intended nor desired it occurred however resulting in eversion *of the abscess cavity without formation of* secondary abscess Recovery

Follow up note November 14 1921 Patient stated that he was discharged from New York Eye and Ear Hospital on October 7 1920 to his home He was not confined to his house at any time since his discharge from the hospital He went out daily and looked for work He felt perfectly well He was unable to obtain work until about 10 weeks after his discharge on account of a strike at the end of which time however he succeeded in getting a position as a cutter of men's clothes a position similar to the one which he held before his illness He continued at this work without interruption except for his yearly vacation until September 1923 He then gave up his position and opened his own store at Coney Island He is part owner of a Cigar and Stationery Store and Ice Cream Parlor and continued at this until the present date The work in addition to his usual duties within the store entails delivery of newspapers to the residents of Sea Gate and requires a considerable amount of walking He was married in November 1921 At the present time he is in perfect health and has no complaints whatsoever While in the hospital in July 1921 before the mastoid operation he weighed 135 pounds Upon discharge from the hospital—15 pounds after having remained at Burke's Foundation for about weeks at which time he returned home he weighed 165 pounds At the present time 3 years and 4 months following operation his weight is 175 pounds

Otological examination (Dr Stuart L. Craig) November 2 1923 His hearing is practically normal *Drum* shows some scar tissue in posterior segment and some thickening but is in fair position The mastoid area shows a depressed scar edges smooth and entirely healed The area over the temporosphenoidal lobe shows no hernia

CASE 2 T W Bellevue Hospital—Brain Abscess No 15 male Russian Jew age 46 occupation blacksmith admitted Second (Correll) Medical Division March 1 1923

On February 22 1923 while working as a blacksmith in a round house for a railroad company in Pennsylvania he fell and struck the right side of his forehead against an upturned chisel and received a wound of the right frontal region He was not unconscious The wound was sutured by the company doctor without roentgenographic plates having been made He remained in the hospital about 10 days at the end of which time he again resumed his work for a period of 5 days. On account of pains in his head he did he gave up his work The wound never completely healed He had severe pains in his head which he tried to relieve by drinking liquor He came to New York and walked to Bellevue Hospital to which institution he was admitted

Physical examination Patient had an inflamed lacerated wound about 13 inches long in right frontal region *General physical examination* was negative Three days after admission he developed slight facial weakness of left side Seven days after admission patient was decidedly lethargic but when aroused he could talk He was unable to use his hands properly especially the left hand He had a slight left facial weakness paresis of left arm and leg clonus of both sides increased reflexes on both sides Ophthalmological note Nystagmus. No paresis or paralysis of ocular muscles Right pupil larger than left very slight response to light Fundi papilloedema right with circumscribed retinal oedema Numerous hemorrhages and spots

[1] A summary of each case is given in this paper on account of limitation of space The complete report will be given in book form

of exudate Left fundus optic neuritis with little elevation of disc Diagnosis brain abscess frontal lobe right secondary to compound fracture right frontal region

March 26 1923 *operation* for brain abscess frontal right Local anæsthesia was used A large encapsulated pear shaped abscess was evacuated of thick yellow pus—streptococcus hæmolyticus Exposure was done by making a large cranial defect overlying the abscess cavity with frontal sinus curettement and removal of overlying cortex about 1 5 centimeters in thickness No drains were used There was partial herniation of abscess cavity before the operation was completed maximum herniation about seventh day after operation Dressings were changed daily and wound was dakinized A rather thin walled hernia overlying the anterior horn of the right lateral ventricle completely receded in 71 days There was no leakage of cerebrospinal fluid Highest temperature 100 6 degrees on third day after operation He was discharged from Bellevue on one hundred and first day following operation with no complaints Weighed before injury 166 pounds weighed 132 pounds before admission weighed 170 pounds when discharged from hospital General condition excellent Recovery

Follow up note No information was received about patient until August 22 1923 when it was reported by an attorney for the Polish Mission for the Diocese of Pennsylvania that he was in Philadelphia On November 8 1923 it was learned that he had gone to West Virginia where he had resumed work

Case 3 C D Bellevue Hospital Brain Abscess No 14 male age 26 occupation fireman New York City Fire Department admitted March 26 1923 Service of Dr T A Smith Director of 4th Surgical Division

Patient stuporous and could give but little history From his sister it was learned that 3 weeks before admission he was operated upon in another hospital for mastoiditis left side simple mastoidectomy being done Previous to the mastoid operation he had influenza after which his left ear drum was punctured

Physical examination Patient was stuporous but could be aroused by examination Answers questions very slowly Blood pressure 80 Temperature 100 degrees Pulse 70

Neurological note Patient stuporous and therefore uncooperative Local condition was not examined There was bilateral early papilloedema right greater than left Slight facial weakness and pyramidal signs present on right side asterognosis right side Impression of superficial examination brain abscess temporoparietal left

Surgical note Diagnosis Brain abscess temporosphenoidal lobe extending into parietal lobe left secondary to mastoiditis with simple mastoidectomy left

Cardinal points (1) Drowsiness or stupor (2) infected postoperative wound following operation for mastoiditis left with inflammatory zone about wound and unhealthy granulation tissue in wound (3) astereognosis right (4) history symptoms beginning about 2 or 3 weeks after radical operation for mastoiditis (5) engorgement of retinal veins especially left (6) sensory aphasia (7) right facial weakness

Operation for brain abscess advised to be done as soon as possible

Otological note Right ear negative Left ear shows postoperative simple mastoidectomy Drum is grey There is no bulging or signs of an acute middle ear infection Postauricular wound has small piece of old gauze packing on removal a dirty wound was seen filled with seropurulent material Granulations were present beneath and are of an unhealthy type No connection is noted between the antrum region and wound No cordlike mass is felt in neck

Diagnosis of temporosphenoidal lobe abscess is concurred in and operation advised

Through the courtesy of Dr T A Smith patient was transferred to Second (Cornell) Surgical Division for operation

March 27 1923 *operation* under local anæsthesia Pathological findings external mastoidectomy wound as described above Dura had been exposed at time of last operation to an area about size of a dime At this site the dura is adherent to cortex Through a trephine opening made about 1 inch above the exposed area of the dura a puncture was made with a blunt brain cannula and rather thin oily pus was obtained at first puncture—staphylococcus aureus Opening was enlarged until a cranial defect about 2 inches in diameter was made Cortex about 1 centimeter thick overlying abscess cavity was removed The abscess was non encapsulated First contents evacuated were rather thin oily pus residual contents of cavity thick and contained necrotic brain material Abscess considered to be of rather recent formation Herniation of floor of abscess noticed on table No drains

Summary of postoperative course Dakinization of wound and daily dressing A large brain hernia reached its maximum about eighth day There was complete eversion of abscess cavity The hernia completely receded in 44 days aided only by one lumbar puncture on thirty first day Dakin's solution was used throughout Dressings were applied to protect and to prevent compression for thirty nine days after which there was applied a slight compression dressing with granulating surface covered with adhesive plaster strips Highest temperature 100 8 degrees F on first day after operation There was leakage of clear cerebrospinal fluid through hernia from seventh to twelfth day Patient discharged on sixty seventh day Weighed 145 pounds when first out of bed weighed 150 pounds when discharged General condition excellent Recovery

Follow up note November 14 1923 Returned to duty as fireman in New York Fire Department—watch duty and messenger—September 7 1923 5 months and 11 days after operation This duty

entailed work both during the day and at night *October 6 1923 transferred to day duty as in spector of garages fire hazards and so forth is on this duty at the present time* He now weighs 190 pounds His general condition excellent November 23 Although homonomous hemianopsia developed after hernia had reached its maximum and persisted until after hernia subsided at present time patient s vision is normal He says that he feels as well as he ever did

CONCLUSIONS

1 Various operative procedures heretofore described in which numerous kinds of drainage materials were used have usually been followed by a high mortality rate

2 In all of these procedures described, prevention of hernia cerebri has been desired

3 In this paper the following is advised

a Creation of a rather large cranial defect directly over abscess cavity

b Complete unroofing' of the cavity

c Complete herniation or eversion of the cavity

d Dakinization of area throughout treatment

e Prevention of trauma and early compression of hernia cerebri

f Recession of hernia

g Adhesive plaster strapping

h Epithelialization

4 Results Three cases which were consecutively operated upon and treated in this manner have recovered There was no mortality in this series of cases

NOTE I am indebted to Drs John McCoy and Stuart L. Craig of the New York Eye and Ear Infirmary for courtesy of permitting me to operate upon Case 1 to Dr John A Hartwell director of the Second (Cornell) Surgical Division Bellevue Hospital for permitting me to operate upon Case 2 and 3 as well as for helpful criticisms of the paper and to Dr De Witt Stetten for helpful criticisms in the writing and criticism of the paper

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PSEUDOMYXOMA PERITONEI[1]

By EMIL RIES M D Chicago
Professor of Gynecology Post Graduate Hospital and Medical School

FORTY years ago Werth gave the first clear description of a clinical entity which he called pseudomyxoma peritonei He defined it as a change in the peritoneum which is a complication of ovarian cysts It is caused by a peculiar reaction of the peritoneum to the jelly like material which has escaped into the peritoneal cavity by way of spontaneous perforation of ovarian cysts

He says further At the operation or autopsy the peritoneal cavity in these cases is found filled with gelatinous material in its entire extent This material is found partly lying free partly in the form of thick semi transparent layers lying on and firmly attached to the abdominal wall and the intra abdominal organs The masses contain delicate connective tissue membranes and fine vessels At times the gelatinous substance is enclosed in a delicate connective tissue membrane and forms especially on the intestine polypoid pedunculated structures

Werth s definition specifies that at least part of the colloid material must be firmly attached to some one or more abdominal organs and the term of pseudomyxoma peritonei should be limited to cases presenting this feature Many ovarian tumors show rupture and escape of their contents into the abdominal cavity but as long as none of this material has become a part of some organ in the abdomen we can not properly call the case one of pseudomyxoma peritonei

On the other hand if an appendix for instance has become a cyst with colloid contents and some of these contents has escaped into the peritoneal cavity or its lining within a limited radius from the appendix even without filling the whole cavity the condition might properly be called pseudomyxoma peritonei (for instance the cases of Vecchi Tomita s own case and the case of Ribbert s which he reports the case of Loth Honecker s Case 2 Goedel s case the cases of Neumann and Hueter)

The literature contains a considerable number of cases of cystic appendix with more or less colloid contents but the dividing line between cystic appendix and pseudomyxoma peritonei lies in Werth s criterion of colloid material lying on and firmly attached to the abdominal wall and the abdominal organs

After Werth s first description numerous cases were reported mostly by gynecologists who observed pseudomyxoma peritonei in connection with ruptured ovarian cysts But in 1901 Fraenkel first described the same condition in a man and demonstrated the origin of the gelatinous masses from the ruptured appendix Since then numerous cases have been found in man originating in the appendix The same finding in women is recorded by Honecker who reports an early stage of pseudomyxoma peritonei in a woman of 50 years who had normal ovaries Michaelson reports gelatinous material in the abdomen surrounding and escaping from a perforation in the appendix with the adnexa normal Cramer reports a woman of 50 with the abdomen full of jelly and both ovaries quite normal

A most remarkable case is reported recently by Lauche and later by Schildhaus who found pseudomyxoma peritonei in a man starting from cysts originating in an umbilical tumor of the omphalomesenteric duct

A last variation in the etiology of pseudomyxoma peritonei is supplied by those very rare cases in which both ruptured ovarian tumors and perforated cysts of the appendix furnished the material which filled the abdomen

This finding is reported by Bailey who reports the case of a woman of 52 years whose abdomen was found full of gelatinous material and to contain a left ruptured ovarian pseudomucinous kystoma and an appendix 7 centimeters long and 2 5 centimeters in diameter which showed a perforation at the tip and gelatinous material at this point

While in Bailey s case an actual opening in the appendix wall is demonstrated in other

Read before the Chicago Gynecological Society May (For discussion see page 67)

cases of combination of pseudomyxoma peritonei with ovarian tumors and distended appendix the reports contain no statement of any open communication between the jelly in the appendix and the free peritoneal cavity

Such cases are reported by Novak (two cases) Christiani Pfannenstiel In other cases pseudomyxoma in connection with ovarian tumors was found in a first operation while a cystic appendix was discovered in a subsequent operation Such cases are reported by Eden and Rathe

Or the pseudomyxoma peritonei was discovered in a first operation for hernia and the cystic appendix was not found until the post mortem as in Hueter's case

Bland Sutton reports three cases in which he found cystic appendix with bilateral cystadenomata of the ovaries without mentioning pseudomyxoma peritonei

This much is certain that the finding of a cystic appendix together with ovarian kystomata is not a rarity

Two perfect examples of combined ovarian pseudomucinous kystoma and pseudomyxoma peritonei with open colloid cyst of the appendix occurred in my practice the first in 1907 and the second in 1923

In 1907 Dr Naylor of Missouri brought me a patient of 57 years with the following history

Mrs M C had a menstrual record without abnormalities She had had two normal labors in her nineteenth and twenty third years with normal puerperiums At the age of twenty seven she had one abortion of 3 months without known cause and without pathological sequelæ Her menstruation had appeared last at her forty third year

She had had influenza repeatedly but was otherwise in good health until her fifty first year when she was taken sick with pain in the region of the appendix and fever but no vomiting She was sick 9 weeks and her physician diagnosed appendicitis After this attack she suffered from constipation sometimes and passed blood at stool In her fifty fifth year she began to notice that her clothes seemed tight and for 6 months previous to my examination she had noticed a tumor in the abdomen and pain in the region of the appendix She was constipated had poor appetite had some incontinence of urine on pressing or coughing She had weighed 104 pounds when 54 and now weighed less than 90 pounds

The patient appeared thin and in discomfort Varicose veins on the right leg were the only abnormal findings except those in the abdomen

The abdomen was evenly distended by a tumor which presented dull sound on percussion and distinct fluctuation on palpation There was no distinct dulness in the flanks The circumference of the abdomen was 90 centimeters Vaginal examination showed moderate laceration of the perineum slight cystocele and rectocele uterus high up in front small Behind the uterus the cul-de-sac contained indefinite soft masses through which the lower convexity of the tumor could be palpated

Operation was performed June 14 1907

When the abdominal cavity was opened in the mid line colloid material in large quantities floating free in the peritoneal cavity escaped The tumor was the size of a woman's head and belonged to the left side It was a kystoma without any twist of the pedicle The tube was stretched across it The broad ligament formed a convenient pedicle At the lower end of the tumor was a perforation out of which colloid masses were seen escaping The tumor was easily removed and the colloid masses dipped out of the cavity The right ovary and tube were perfectly normal but atrophic and were removed

The appendix was embedded in colloid material It was removed flush with the cæcum without leaving any stump and the resultant opening in the cæcum was closed by sutures Colloid material was wiped off the peritoneum the omentum and the intestine wherever accessible

A small nodule which was felt in the umbilicus gave the indication for an extension of the abdominal incision sufficient to excise the umbilicus before the abdomen was closed by suture in layers

The ovarian tumor was a multilocular pseudomucinous kystoma with a round opening the size of the palm of the hand which communicated free with the largest cyst of the tumor mass and from which colloid material was flowing

The appendix was thickened After the colloid material with which it was surrounded had been detached as far as possible an opening at about the middle of the appendix was seen which had a smooth edge and from which a papillomatous mass protruded which was covered with colloid material

The second case came to observation in 1923

Dr Izaakovitch consulted me with his patient Mrs F L 40 years old, who had suffered from cough and choking spells for 11 years These spells had become milder for the last 2 months Her menstruation had begun at the age of 12 and returned regularly It now appeared a few days too soon and lasted 3 to 4 days with moderate loss of blood without pain The last menstruation had begun October 1 and had lasted 5 days The patient had had three labors the last in 1918 They as well as one abortion of 6 weeks in 1913 had had no pathological sequelæ

The patient had a slight vaginal discharge no bladder disturbance but poor appetite some belching after eating no vomiting no constipation be

had increased in weight For the last few months she had noticed gradual increase of her abdomen with almost no pain but some discomfort on stooping and a feeling as if something were moving around in her

The examination showed slight varicose veins of both legs and a few diffuse râles over both lungs Otherwise aside from the abdominal findings there were no abnormalities The urine was normal

The abdomen was distended moderately There was a small umbilical hernia and no dulness in the flanks A cystic tumor could be felt arising out of the pelvis to two fingerbreadths above the umbilicus It fluctuated distinctly No separate nodules were to be felt on it There was some mucous discharge from the vagina no infection of the urethra or labial glands The anterior and posterior wall of the vagina protruded considerably The uterus was in normal position It could be felt bimanually in front of the tumor The tumor filled the cul de sac The ovaries could not be palpated separately There were some small external hæmorrhoids

The operation was performed November 12 1923 It consisted of a vaginal plastic and the laparotomy The abdomen was opened by median incision from the symphysis to a little to the left and above the umbilicus The omentum appeared in the incision red and covered with some colloid material It was pushed up by the tumor which appeared to the right of it The tumor was the size of a man s head On the posterior aspect of the tumor was a circular opening the size of the palm of the hand with smooth edge out of which colloid material was escaping in streams Colloid material was further found in the cul-de sac in front of the uterus and lying on the intestine A smaller tumor of the left ovary was found in Douglas pouch and was intact Both tumors were removed easily and then the jelly was dipped out of all readily accessible parts of the peritoneal cavity and wiped off the omentum intestines and mesentery The gall bladder was found soft and free from stones It was not covered with colloid material

The appendix was distended to the thickness of a thumb at its middle and was covered with firmly attached masses of colloid material It was removed Excision of the umbilical hernia entrofixation of the uterus and suture of the abdominal walls in layers completed the operation

The histories of these two patients present the type common to benign ovarian tumors The record of a preceding attack of appendicitis is not a prominent feature considering the general frequency of appendicitis

Preceding attacks of appendicitis have been noted quite frequently in cases of pseudomyxoma peritonei which originated from the appendix alone in the female by Honecker in his second case by Neumann Cramer and others while they have been recorded for the male by Honecker in his first case by Hartmann and Binet and by Loth However they are not recorded uniformly

The rupture of the ovarian tumors did not appear to produce any symptoms noticeable to the patients in my cases or for the matter of that as a rule in the cases recorded in the literature

The appearance of the peritoneal cavity in the two cases reported here corresponded closely to Werths descriptive definition aside from the presence of the ruptured appendiceal cysts

The ovarian tumors in both cases were simple pseudomucinous cysts of typical structure without any signs of malignancy The same finding is recorded in all descriptions of this kind of case with the exception of the cases of Strassmann and Wendeler who found mixed tumors Wendeler found hair and fat besides the colloid producing part of the tumor and Strassmann found an enormous ovarian teratoma

The appendix of the first case is about the thickness of the little finger it is five centimeters long and presents an opening the size of a pea at the antimesenteric border at the middle of its length

Cross sections of the appendix at the cæcal end show complete obliteration cross section through the middle shows a cavity from which the warty growth protrudes and cross sections through the distal end again show complete obliteration

Microscopically the obliterated cæcal and distal portions of the appendix show the center of the appendix formed by connective tissue and fat with only very minute groups of lymphoid tissue without any mucosa or muscularis mucosæ The circular and longitudinal musculature of the appendix is well preserved and strong On the outside of the serosa masses of mucus are seen in which fine capillaries fine strands of connective tissue a few lymphocytes and some connective tissue cells with brown pigment are seen

The central part of the appendix shows an irregular narrow lumen which is mostly filled by the tumor mass (Fig 1) which consists of fine papillæ with a high cylindri

cal epithelium The papillæ contain small amounts of connective tissue and fine capillaries The epithelium is high cylindrical with many goblet cells The cells are frequently arranged in sheaves and fine streamlets of mucus are seen starting out from the papillæ Some of the papillæ have lost their epithelium and their connective tissue is exposed and covered with mucus containing some red blood cells The circular and longitudinal muculature at this point is quite as thick as in a normal appendix and shows a gap at which the muscular layers turn outward pushed apart by the protruding papilloma

No epithelial cells are seen free in the masses of mucus on the outside of the appendix The peritoneal epithelium is nowhere visible where the mucus on the outside is in direct contact with connective tissue of the subserosa from which the fine strands of connective tissue and the fine capillaries penetrate into the superimposed mucus At the points where no mucus is lying on the appendix the peritoneal epithelium is well preserved especially in every little recess

The appendix of the second case 6 centimeters long is of the thickness of a thumb at its middle and covered with colloid material on the outside At about its middle (Fig 2) it shows at the antimesenteric border a transparent nodule the size of a pea also covered with colloid material After hardening the appendix is cut across at this point The cross section (Fig 3) shows a narrow duct communicating at one end with the widely distended lumen of the appendix and at the other end opening in a little mass of jelly which is continuous with jelly covering the rest of the outside of the appendix The lumen of the appendix appears as a roundish cavity the size of a *hazelnut* and contains clear mucus of rather thinner consistency than that escaping from the ovarian tumor The lining of the cavity appears macroscopically smooth

At both ends of the cavity in the appendix there is complete obliteration

The wall of the cavity consists of an outer layer with some of the mucus attached to it then a much thickened longitudinal and circular layer of muscle The circular layer is lined with a high cylindrical epithelium which in many places rises up in very delicate papillæ with a minute connective tissue core covered with a very high columnar epithelium with many goblet cells (Fig 4) The epithelium is crowded together so that in many places it rises in sheaves At no place is there any multiplicity of layers or any invasion of the underlying tissue

Sections through one wall of the diverticulum leading into the peritoneal cavity show the muscular tissue of the appendix turning into the wall of the diverticulum, but soon lost leaving nothing but connective tissue forming the wall (Fig 5) The diverticulum has no epithelial lining The epithelium of the appendix stops a short distance from the inner opening of the diverticulum as a microscopic ridge of epithelial cells such as is often seen where epithelial lining ends at the edge of a raw area (Fig 6)

Neither in the mucus at the outer mouth of the diverticulum nor in the mucus surrounding the entire diverticulum is there any trace of epithelial cell The mucus is attached to the outside of the diverticular connective tissue framework and is permeated by fine capillaries and scant connective tissue

It would be easy to find areas in both of these appendices which look so much like ovarian pseudo-mucinous kystomata that were it not for the muscular wall of the appendix one could easily be mistaken for the other

In many reported cases of pseudomyxoma peritonei originating in the appendix it is stated that the inner lining of the appendix was perfectly smooth but our second case shows that it is always necessary to control such statements by microscopic investigation The lining appeared perfectly smooth in this second case but the microscope demonstrated distinct papillary tumor formation The minute papillæ of the second case are evidently an earlier stage of the high and extensive papillary growth which was observed in the first appendix

I find only one similar report in the literature Novak's Case 1 showed a papillomatous mass embedded in gelatine in the cystic appendix

Formation of diverticula in cystic appendices is not rare and a number of cases are

reported in which the diverticula were so thin walled that communication with the abdominal cavity under the pressure of the mucous contents might readily be expected to take place at some time even if it was not present at the time of operation It is quite within the possibilities that such diverticula may open up under pressure and then when by escape of the cyst contents the pressure is relieved may heal shut again until the pressure increases again and the process repeats itself The fact that the diverticulum in Case 2 had no epithelial lining is suggestive in this respect If the diverticulum had an epithelial lining it would be unlikely to heal shut even temporarily but walls consisting of connective tissue alone may readily agglutinate and close for a time and give way again under pressure Cystic appendices may give way and discharge mucus even without diverticulum formation The muscular wall thick as it is and the cleft like lumen of the appendix in the first case represent well the stage of the collapsed appendix after expulsion of the contents through a gap in the wall without a diverticulum

The numerous cases reported in which cystic appendix was found together with pseudomucinous kystoma of the ovary are therefore all potentially at least in the same group as my two cases even though at the time of the operation no opening was seen in the appendix

Cystic appendix or so called mucocele of the appendix is not a rare finding It is one stage



Fig I pillary t mor alm t fill g lum n f ppend x (Ca e)

in the changes taking place in the appendix which may ultimately lead to pseudomyxoma peritonei for of course while an ovarian tumor may cause pseudomyxoma peritonei merely by bursting the appendix has to be prepared for undisturbed production of mucus by several previous pathological stages by which it is shut off from the cæcum The reports in the literature are quite uniform as to the complete shutting off of the cystic part of the appendix from the cæcum The asepsis of the appendiceal discharge must be safe



F g Appe l f C se Th pe l l b haped On t free b rd m ses f pse l my m Th m t prom nt le at th seat f th d t cul m



F g 3 C os sect of appe d x f Case Th l m n f th ppe l s w d ly d l te l d t c l m is se mmu cat g f ely with th per to al ca ty Ma ses of pseud myx ma re atta hed to t on th uts de





guarded before the peritoneum can tolerate the product of the rupture appendix In one case on record (Honecker's Case 1) the distal end of the appendix contained a fecal concretion but the discharge from the appendiceal perforation was mucus so that even the fecal concretion in this case must have become aseptic

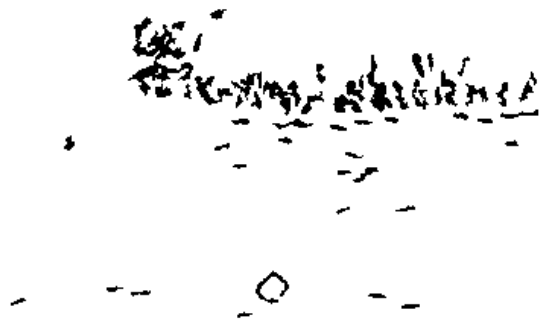
The possibility of alternating rupture and *closure of ovarian tumor has to be considered* in the cases of pseudomyxoma peritonei in which no perforation of the tumor is visible as for instance in Werth's own case in which he states that no perforation was visible though he thinks it may have been overlooked In the light of present day knowledge the possibility of his case having been an appendiceal case can not be denied

The opening in the ovarian tumor of my second case was examined microscopically on this account Since the epithelium of this pseudomucinous kystoma is in very active growth it could be expected that a rupture opening of long standing would be lined with epithelium all around Such epithelial lining would tend to keep the rupture open permanently and allow continuous discharge of mucus into the peritoneal cavity But the microscopic examination of the edge of the opening in the ovarian tumor of the second case shows no such complete lining with epithelium On the inside of the cyst the epithelium stops at a short distance from the hole itself becoming gradually flatter until it *ultimately is lost entirely and the edge of the* opening itself consists of connective tissue only (Fig 7) From this it may be concluded that healing of the rupture of this part of the ovarian tumor could take place at least temporarily Such ruptures healed over by delicate cicatricial structures may be the area at which ovarian tumors rupture at the time of operation even under gentle handling

SOURCE OF MUCUS IN ABDOMINAL CAVITY

Given the perforation of the appendiceal or ovarian cyst with consequent escape of contents *into the peritoneal cavity* the reaction of the peritoneum has given rise to a great amount of discussion

The idea prevailed for a time that the pseudomyxoma peritonei was a myxomatous tumor of the peritoneum itself produced by a kind of infection of the peritoneum by the mucus in



I g 6 The ; th l um f th appe l al y t t rm n tes n ri lge bef r eachin th rupt e pe ng (Case)



F g L lg of ruptu e pen ng in varian cyst (Case 2) c isting of onnective tiss e nly

vading it and causing it to produce mucus on its part independently This hypothesis is abandoned first because there is no warrant for any such process anywhere else and second because the examination of the relation of the peritoneal epithelium to the masses of colloid in the peritoneal cavity has proven beyond dispute that the pseudomyxoma masses are superimposed on the peritoneal epithelium It is true that the peritoneal epithelium may be lost here and there as under adhesions of inflammatory origin It is also true that the peritoneal epithelium may be found in places on top of the pseudomyxomatous masses But it is easy to demonstrate that there are always more or less extensive stretches of *serosal epithelium well preserved under the* masses of mucus

In my Case 1 the normal atrophic ovary of the right side was covered with colloid material which could not be detached easily But the surface epithelium of the ovary could be seen in many areas perfectly distinct under the mucus though in other places the mucus was in direct contact with the cortical layer of the ovary (Fig 8) The cortical layer itself showed no myxomatous formation whatever Also the surface epithelium of the ovary could be seen creeping up the underside of the mucus wherever well preserved surface epithelium had maintained a hold on the cortical layer The ovarian epithelium in this respect behaves exactly like the epithelium of the peritoneum otherwise

The reaction of the serosal epithelium is the same as we are wont to see it in the presence of inflammatory irritation be it of bacterial or foreign body origin

Numerous cases are reported in which after removal of the original ruptured ovarian tumor or appendix the pseudomyxoma peritonei was not arrested but continued with unabated energy to produce more colloid material in the peritoneal cavity as well as in its wall until the final destruction of the individual In the days *before Fraenkel taught* the connection of the appendix with pseudomyxoma peritonei it is certain that operators removed ovarian tumors without looking for the appendix and may have left behind an appendix affected in the way the two cases reported here were affected As late as 1913 Rathe gives a suggestive report of this kind His patient was first operated on in 1909 for cystic ovarian tumors one of which had ruptured at removal At this time free jelly was found in the abdominal cavity Nothing at that time was noticed concerning the



Fig 8 Healthy ovary of Case showing normal germinal epithelium creeping over the inside of the pseudomyxomatous sessile attached to the ovary

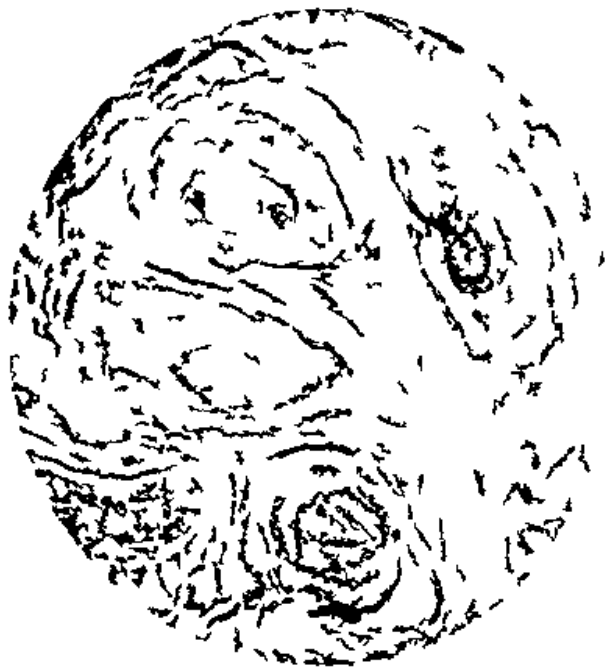


Fig 9 Nodule in the umbilicus of Case showing pseudomyxomatous sessile without epithelium

appendix In March 1912 a gelatinous tumor of the peritoneal side of the abdominal wall was extirpated and nothing else was found in the peritoneal cavity In October of the same year another tumor in the abdomen was found At operation multiple tumors were found on the right broad ligament on the bladder on the small intestine and now a site of the appendix was found and removed which was full of colloid material It showed no perforation but its wall contained tumor masses

On the other hand there are cases *in which* the appendix the source of the pseudomyxoma peritonei was removed and the pseudomyxoma peritonei reappeared afterward and terminated the life of the patient (Case 3 Michaelson)

It is *clear therefore that once the pseu*domyxoma peritonei has become established it may continue to grow afterward independently The authors are well agreed that these cases are by no means to be confounded with *malignant growths as the findings in the metas*tases do not support a diagnosis of carcinoma in any way To explain the reappearance or continuation of the pseudomyxoma peritonei after removal of the original tumor various theories have been offered

In the vast majority of cases it is decidedly difficult to find any epithelial elements in the colloid masses Investigators who have persistently looked for such epithelial masse have had very meager result In some cases originating in ruptured ovarian pseudomucinous cysts small quantities of epithelium arranged in the same way as the epithelium of the original ovarian cysts have been found for instance by Fraenkel in his Case of his 1912 publication In some cases originating in ruptured appendiceal cysts very small quantities of epithelium arranged in ribbon have been observed for instance by Comolle (ribbon in a spleen metastasis) and Hueter and Merkel who found epithelium in tumor masses at a distance from the appendix But in the *majority of cases no such epithelial source* of possible continued growth of pseudomyxoma peritonei could be discovered Naturally it is impossible to examine the entire peritoneum of a case of pseudomyxoma peritonei At any rate it is quite clear that epithelium of any kind is a very occasional observation in the masses of mucus superimposed on the peritoneum in these cases with one exception This exception is to be made in favor of the peritoneal epithelium itself which in practically all cases

is observed in more or less extensive areas under the superimposed mucus as is described above for the ovary in my first case

The question now arises Is it possible for the peritoneal epithelium to assume the function of producing mucus? The recent discussions of tumors of the type of uterine adenomyomata have shown a tendency to attribute the source of these tumors to erosal epithelium At present neither reports in the literature nor my own findings in my two cases have shown evidence of any extensive production of mucus from the erosal epithelium

Lauche describes quite extensive tumors of the type of uterine adenomyoma (3 cases of his own and 21 from the literature) located in the umbilicus and giving evidence of menstrual function But the little tumor in the umbilicus of my first case of 1907 shows no adenomyomatous structure On the contrary it consists of masses of mucus without any epithelium that I could find The mucus (Fig 9) is arranged in nests in more or less parallel layers in the same way in which we see the mucus come out of the epithelial cells in the ovarian pseudomucinous kystoma or in the papillomatous appendix of the same case There is tissue reaction in the shape of infiltration with round cells scant in the mucus more extensive in the surrounding tissue Numerous plasma cells are seen at the edge of the masses of mucus (Fig 10) But at no point could I demonstrate any epithelium

It is possible that epithelial cells were originally implanted in this tissue were crowded out and disappeared entirely after having given rise to the mucus But it is also possible that this mucus was crowded into the connective tissue interstices from the full peritoneal cavity without any epithelium accompanying it and simply became encapsulated The nests of mucus reach neither the skin surface nor are they in direct contact with the peritoneal epithelium

Similar observations have been made in the hilus of the spleen and in the hilus of the liver (Michaelson s Case 3)

Nevertheless with our present understanding of pathology we have to assume that the continued growth of pseudomyxoma peritonei after operation must be due to epithelium implanted proliferating and secreting



Fig o One f th p ud my m tou nodul in the mbil c of Case nd h gh po r sho ing pa llel arra gem nt f strand f p ud my om to s mat rial and u d ell infiltrat on No pith l m is to be s en

METASTASIS

In cases like the two reported here two sources of the mucus pour their contents into the abdomen the ruptured ovarian tumor and the ruptured appendix But in the masses of mucus found in the peritoneal cavity and on the intra abdominal organs the gelatinous material looks alike everywhere The gelatinous contents of the ovarian tumors in my cases were rather thicker than those of the appendix but in the peritoneal cavity the masses appeared much the same everywhere

As mentioned above the structural resemblance between the papillomatous tumor in the appendix and the papillary elevations in the pseudomucinous kystomata of the ovary is such that they are practically identical Is it possible that the appendiceal papillomata were metastases of the ovarian tumor? Or on the other hand is the ovarian tumor a metastasis of the appendiceal papilloma?

This suggestion was raised as early as 1913 by Bondy in a discussion of Rathe s case

The possibility of the appendiceal cases being metastatic from the ovarian tumors is of

course excluded at once and completely by the numerous observations of pseudomyxoma peritonei in man

The reverse possibility of the ovarian tumors being metastatic from the appendix is excluded by the fact that the pseudomucinous kystomata in these cases present an absolutely identical structure with the ordinary pseudomucinous kystomata found in hundreds of cases with no question of disease of the appendix from which they may have arisen

It is remarkable indeed how frequently coexistence of a pseudomucinous kystoma of the ovary and cysts of the appendix of various natures is mentioned in the literature of pseudomyxoma peritonei Aside from Pfannenstiel's suggestion that the organism may have excreted in the appendix pseudomucine absorbed from the peritoneal cavity nobody has ventured to assume any connection of cause and effect between the two

CHEMISTRY OF THE COLLOID MATERIAL

The contents of the tumors are generally described as pseudomucine while the contents of the cystic appendix have generally been called mucine Lewis in 1914 published some chemical investigation of a very remarkable instance of pseudomyxoma peritonei In her case the patient had bilateral ovarian tumors removed 22 years before she came to operation with a pseudomyxoma peritonei Unfortunately the paper mentions nothing whatever about the condition of the appendix in this case We are therefore in the dark as to whether the chemical researches refer to gelatinous material from an ovarian or an appendiceal source

VARYING MALIGNANCY

It is claimed by some authors that the pseudomyxoma peritonei originating in ruptured ovarian tumors is much more liable to continue even after careful operation and to kill while the pseudomyxoma peritonei following ruptured appendiceal cyst is supposed to be less fatal However the literature contains instances of recurrence and fatal outcome as well as apparently complete cure by operation whichever the original source of the pseudomyxoma may have been

DIRECTION OF FUTURE OBSERVATIONS

A question of some interest arises here Why is it that no cases of pseudomyxoma have ever been observed originating in the gall bladder or the fallopian tubes? The gall bladder fulfills the theoretical conditions for such an occurrence very well and papillomata of the tubes are not very rare

TREATMENT

The operative treatment of pseudomyxoma peritonei consists of two parts the removal of the original source and the treatment of the pseudomyxoma

The removal of ovarian tumors in the presence of pseudomyxoma is indicated whether they are ruptured or not and since many of these tumors are more or less intrafilamentary the removal of the uterus with them may become necessary But no case of pseudomyxoma peritonei in the presence of ovarian tumors should be considered completely treated without a careful investigation of the appendix Whether the appendix is much enlarged or not whether it forms a ruptured or closed cyst whether it shows diverticula ruptured or unruptured or not it should certainly be removed This removal may even necessitate the resection of the cæcum as Hartmann did in one case which at the operation he considered a malignant tumor of the cæcum If the appendix is so imbedded in the gelatinous material that it can not be isolated the resection of the cæcum may on that account become indicated

If the pseudomyxoma peritonei is accompanied by the formation of nodules in the umbilicus as in our first case that nodule should be removed If omentum is the seat of extensive gelatinous infiltration or separate tumors it had best be removed

The treatment of the gelatinous masses on the parietal and visceral peritoneum is often difficult Washing out the peritoneal cavity is not usually sufficient In Bailey's case for instance the gelatinous masses in the peritoneal cavity were washed out at the operation but when the same patient was operated on ten days later for an inguinal hernia the sac was found filled with gelatinous material Gentle wiping off of the gelatinous masses i

generally mentioned but almost always greater or smaller quantities of the jelly remained behind in recesses of the peritoneal cavity or firmly attached to the organs Since the anatomical examination of the organs to which the jelly was attached has shown so universally extensive loss of peritoneal epithelium under the jelly complete removal of the jelly would of necessity leave great raw areas and would thereby lead to the same extensive adhesions which are the source of so many dangerous conditions in pseudomyxoma peritonei

There is no question about the advisability of removing isolated outstanding pseudomyxomatous tumors but there are limitations to this step as the tumors often are so numerous that their complete removal is impossible

In the early years of our acquaintance with pseudomyxoma peritonei drainage was instituted in order to allow the escape of the masses which could not be completely removed at the operation These patients practically all died In 1903 Goette reports that of 18 patients operated upon only 10 survived At present the mortality is extremely small but drainage is no longer favored

The results of the operations have been good at times even though the entire masses of gelatine could not be removed Operations for pseudomyxoma have been repeated in a number of cases and recoveries for longer or shorter periods have taken place after such repeated operations In 1901 Fraenkel mentions this fact and explains it as a consequence of implanted epithelium dying off by and by

The longest recorded time of cure by operation is that of my first case The patient is now alive and well seventeen years after her operation for ruptured ovarian pseudomucinous kystoma and ruptured appendiceal cyst with papilloma Her physicians Drs C G Lyda and A L Cambre reported in April 1924 that she was as well as her advanced years could allow one to expect In my second case the patient was operated upon in 1923 and is well at present without any signs of recurrence

CONCLUSIONS

1 Pseudomyxoma peritonei is a secondary condition due to the escape of gelatinous material from a primary tumor This tumor arises in the ovaries or in the appendix or both or rarely in other organs

2 The ovarian tumors are always pseudomucinous kystomata in their entirety or at least partially

3 The appendices from which pseudomyxoma peritonei starts are always more or less cystic often show diverticula and may contain papillomatous tumors

4 The operative treatment is successful in proportion to the completeness of removal of the original tumors and the pseudomyxoma peritonei

5 Every case of pseudomyxoma peritonei especially in the female requires investigation of the appendix and its removal

6 The chemistry of the gelatinous masses deserves further study with proper attention to the sources of the colloid material

7 The coexistence of ovarian tumor with appendiceal cyst in pseudomyxoma peritonei is a frequent finding There is at present no evidence of anything more than accidental coexistence of the two conditions

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INFLAMMATORY CARCINOMA OF THE BREAST

A Report of Twenty Eight Cases from the Breast Clinic of the Memorial Hospital

By BURTON J LEE M D F A C S and NORMAN E TANNENBAUM M D New York

INFLAMMATORY carcinoma of the female breast presents such unusual clinical manifestations that they are often misinterpreted by the physician who is first consulted The object of this paper is to give a clear description of inflammatory carcinoma of the breast in order that this unusual phase of carcinoma of the mammary gland may be better recognized by physicians generally and by surgeons and radiologists particularly In addition certain biochemical bacteriological and pathological aspects of this interesting condition are also presented

We have seen a considerable number of patients suffering from this type of mammary carcinoma in which the true significance of the inflammatory phenomena was not apparent Many of these cases have been referred to the Memorial Hospital in the belief that the inflammatory process was some unusual type of infection or that the condition of the skin had been induced by radiation Several times we have presented cases of inflammatory carcinoma before surgical societies but apparently have failed to convince our audiences that these inflammatory symptoms were truly cancerous in nature

Examples of this unusual type of mammary cancer have been described by numerous observers but with variations in terminology suggesting the uncertainty which exists concerning the true nature of this process As far back as 1814 Bell appreciated the gravity of these inflammatory symptoms In discussing carcinoma of the breast he said When a purple color is on the skin over the tumor accompanied by shooting pains it is a very unpropitious beginning Klotz in 1869 in an inaugural thesis wrote about this phase of mammary carcinoma occurring during pregnancy and the puerperium Volkmann in 1875 described it as mastitis carcinomatosa Schumann and Learnmouth have called it carcinoma mastitoides and acute mammary carcinoma while Rodman and Leitch apply the term acute carcinoma of the breast Other authors have described the condition as lactation cancer acute medullary carcinoma acute encephaloid carcinoma inflamed cancer acute brawny cancer and acute scirrhous carcinoma Lardennois and Moure impressed with certain striking pathological features considered it a lymphocytoma of the breast All observers have focused their attention upon the pathology of the breast tumor itself but have failed to recognize the significance of the erysipelatous involvement of the skin Billroth in 1871 described a case of acute cancer of the breast and Rodman in his treatise on Diseases of the Breast reported four cases of Delbet's one of Schmidt's and one of Klotz's Bryant in a scholarly article in Wood's *Medical and Surgical Monographs* for 1889 recognized this condition and cited his observations on several cases Shield also recognized this form of cancer of the breast

From time to time Gross Rodman Blood good and others have contributed to the subject Thus far the most extensive case reports and the best studies of the clinical and pathological aspects of this condition have been given by Schumann who collected 11 cases from the literature His report also included one case of his own The present paper represents a study and analysis of 8 cases 25 of which were seen in the breast clinic of the Memorial Hospital We are permitted to include 3 additional cases through the courtesy of Dr Charles H Peck Dr W S Stone and Dr Bradley Coley

CLINICAL CHARACTERISTICS

This disease is fortunately rare representing but 1 3 per cent of all cases of mammary cancer It is often fulminating and may result fatally in a short time in spite of the most

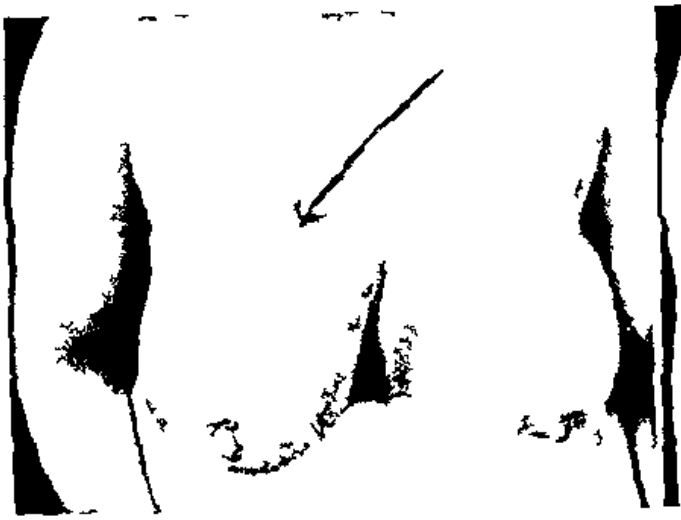


Fig. Ca... H. E. P. im. ry op... bl. inflammat. ry carc. nom... r. ht br. a. t. bef... operat. n



Fig. Ca. e. H. E. Show. g. e. ur. nce f. in flammat. ry ca. ci. ma. m. nths aft. r rad. al m. t. tomy

intelligent therapeutic efforts to control it. Inflammatory carcinoma may occur during pr gnan y or the puerperium when its course is rapid but we have never observed it under these condition

Without subjective symptoms other than heaviness and sli ht burning sen ation the breast of the aff cted side usually increases in ize This enlargement is more often diffuse but in some instances a rather ill defined tumor may be mapped out which is often soft in consistency and never of stony hard ness Almost without exception the lesion has occurred in cases with pendulous breasts and in 50 per cent of these cases lactation has never occurred

The rate of growth i startling in its rapid ity and often the tumor fills the entire breast in a few weeks Shortly after the beginning of symptoms a careful physical examina tion will reveal certain inflammatory mani festations in and about the involved breast The overlying skin is reddened and brawny and this blush may extend far beyond the normal limits of the mammary gland Upon palpation the skin is hot and not infrequent ly slight tenderness is elicited Both breasts may be involved almost simultaneously or in rapid succession When seen early nipple retraction may be absent but later the nipple is definitely retracted and sometimes œdema tous The axillary nodes of the corresponding side become involved early increase rapidly in size and are unu ually bulky The supra clavicular nodes of the same side are pal pable early and in one of the cases the first inflammatory symptom appeared above the clavicle with brawny underlying induration Later nodes in the opposite axilla become involved and the opposite breast may be in vaded by the disease

As the disease progresses the skin becomes deep red or reddish purple and to the touch i brawny and infiltrated The inflamed area presents a di tinct raised periphery after the fashion of erysipelas The infiltration is so marked that the examiner with his eyes clo ed in passing hi hand over the skin can distinguish readily the sharp contrast be tween normal and affected tissue The red ne s may extend far beyond the normal con fines of the breast in some instances reach ing from the sternal region in front complete ly around one half of the chest to the mid line behind or extending downward over the upper portion of the abdominal wall Oc casionally the skin over the opposite breast is likewise red tender and shows increased surface temperature As a rule there is no well marked elevation in temperature but some of the cases have shown an afternoon rise as high as 100 degrees F

There are no constant findings in the mi croscopical examination of the bloods of the cases studied Some cases show a slight leu cocytosis (as high as 14 400 white blood cells)

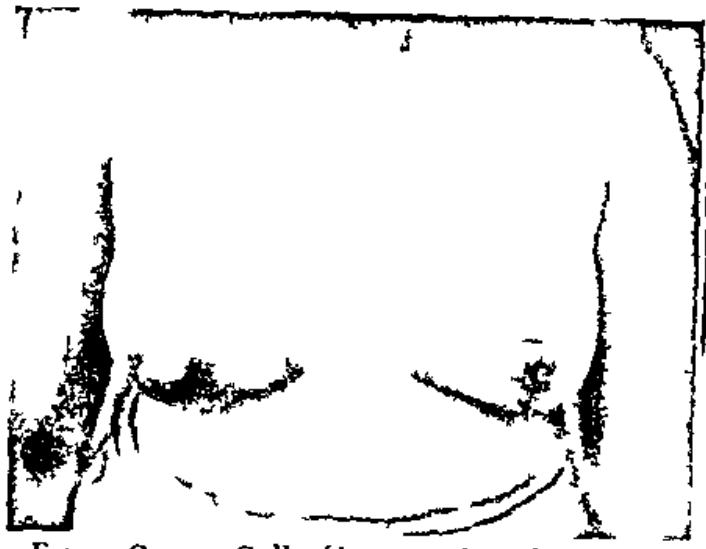


Fig 3 Case 3 C W Showing early oedema of inflammatory carcinoma right breast

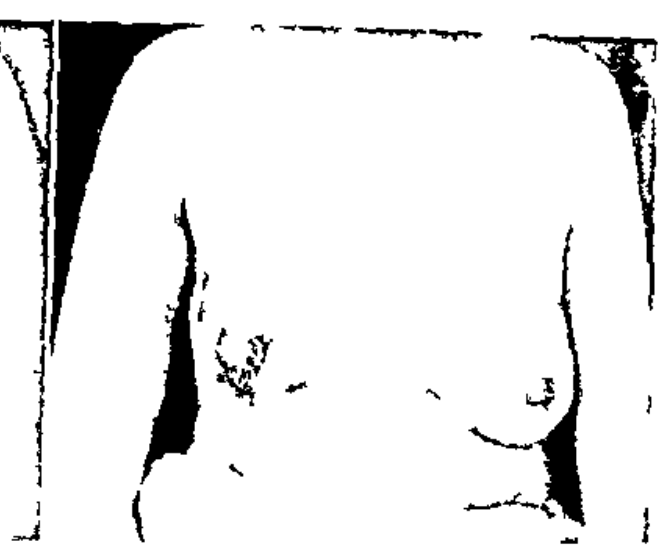


Fig 4 Case 4 D V Primary inoperable inflammatory carcinoma right breast

and in the differential count an occasional increase in small mononuclear cells is noted No eosinophilia is present

Late in the course minute areas of ulceration are occasionally noticed but in no instance did the skin overlying the breast tissue break down *en masse*

As a rule cases seen early show no demonstrable pulmonary metastases but once demonstrated in a chest plate they are rapidly progressive

The patients remain well nourished until late in the course cachexia appearing only in the terminal stages They die from systemic metastases with certain evidences of toxæmia The inflammatory symptoms of the disease persist until the end

We believe therefore that the uniform and unusual clinical behavior of these inflammatory cases justifies their inclusion in a single group

TIME OF APPEARANCE OF INFLAMMATORY SYMPTOMS

Inflammatory symptoms were well established at the time of admission to the clinic in all but two of the cases In many instances it was impossible to ascertain the exact time of appearance of the inflammatory signs In several of our primary cases seen 4 to 5 weeks up to 3 months after the beginning of any symptom the inflammatory characteristics of the disease were very pronounced Therefore we believe that in the majority of cases the inflammatory type of mammary cancer can be properly recognized at the very outset Occasionally certain cases in the breast clinic which have been under observation for a considerable period of time have developed late in the course of the disease skin involvement closely simulating inflammatory carcinoma With our present knowledge it seems unwise to include cases of this sort under the heading of inflammatory carcinoma although it is difficult to determine the exact relationship of these cases to the ones under report

AGE

A considerable number of the patients are young women in our series 10 or 35 79 per cent being 39 years or under The youngest patient was 24 the oldest 62 and the average for the entire group was 44 6 years

TRAUMA

In only 2 of the cases was there any definite *history of trauma* to the breast Hence the inflammatory phase cannot be interpreted as in any sense traumatic in origin

PREVIOUS LACTATION

In 14 or 50 per cent the disease was present in breasts which had previously lactated Therefore prior lactation seem to have no special influence in the development of inflammatory carcinoma In no instance was the disease observed during pregnancy



F 5 Case 4 E E La ge e n lymph ves l in the bc tan us fat t ssue wh ch c ta ns a l ge tum r cell m s



F 6 C o R I Prima y op rable ca ci ma l ft b a t Show begi n g of nfl mm to y symptom o er l ft pra l v ula reg on

or the puerperium but Delbet reported one case occurring during pregnancy one during lactation and two cases irrespective of either condition Case 10 in our own series became pregnant one year and four months after admission and a therapeutic abortion was done immediately

DIFFERENTIAL DIAGNOSIS

In e tablishing a diagnosis the following diseases must be distinguished from inflam matory *carcinoma*

1 Abscess of the breast Inflammatory carcinoma of the brea t in its early phases is frequently mistaken for an acute suppura tive process in the mammary gland In sev eral in tances in this series patients referred to the breast clinic have been explored by sur geons elsewhere expecting to find an abscess The real nature of the process was then re vealed An ill-defined tumor in the breast ab sence of localized tenderness no considerable elevation of temperature and a white blood cell count which is normal or slightly increased should rule out a suppurative lesion

Erysipelas In this region erv ipelas is rather uncommon The disease is quite acute and prostration is marked As in all febrile conditions it is ushered in by a short period of malaise and headache followed by rigor high fever and the appearance of the rash The lesion is vivid red disappears on pressure and is not particularly sensitive and soon vesicles and bullæ form contain ing serum There is a marked leucocytosis The disease within 48 hours progresses rapid ly The acute history with the constitutional reaction and dramatic spread of the lesion together with the decided increase in leu cocyte count is sufficient to distinguish ery sipelas from inflammatory *carcinoma*

3 Radiation changes Several of the pa tients were referred to the hospital in the belief that exposures to X radiation had caused the inflammatory phenomena The ery thema following radiation therapy usually appears in from 10 to 14 days after treat ment It is at its height for another 10 days and then gradually fades away leaving a slightly pigmented skin but with no per manent redness The skin changes stop abruptly in a linear fashion corresponding to the areas of treatment A review of the radiation treatment given and an apprecia



Fig C e rr R T Inmary in peril flamm to ca ci m f the ri ht b t Th k n les n ol es i ner th l of l ft l re t



F 8 L 1 R E L mph ti f d m filled ith loose tumor ll ma es M ked lymph yt c infil trat on of d rm Œd ma from lymph sta

tion of the persistent or progressive char acter of the inflammatory symptoms in thi special form of carcinoma suffices to estab lish the diagnosis

4 *Tuberculosis of the breast* In this con dition the onset is le s acute and the tumor in the breast is never hard in consistency Early in the course redne s of the overlying skin appears and later areas of softening As the process extends the skin over the soft er portions thins out and finally sinuses form which are usually multiple Physical signs of tuberculosis elsewhere may also be demon strated This condition from its chronicity may be readily distinguished from inflamma tory carcinoma

5 *Ulcerating carcinoma of the breast* The inflammatory reaction so frequently found in the skin and subcutaneous tissues associ ated with ulcerating mammary cancer can be easily differentiated from inflammatory carcinoma Ulcerating carcinoma of the breast is the result of a secondary invasion and destruction of the skin by the tumor with concomitant infection In all cases in this report the history and physical examina tion have proven to our satisfaction that the inflammatory symptoms present were cer tainly not dependent upon a break in the skin or some minute ulcer Except in the terminal stages inflammatory carcinoma is never ulcerating In many of our fatal cases there was no break or ulceration of the in flammatory skin at the time of death

6 *Cancer en cuirasse* This form of car cinoma of the breast usually occurs in a pa tient over 50 and extends over a period of years being notable for its chronicity In the beginning the tumor is small discrete and belongs to the type which Cheyne call atrophic scirrhus The skin is slowly in volved becoming thickened and sli htly pinkish and this condition may extend until it includes a large portion of one or both sides of the mammary and anterior chest regions Later small and large ulcerati areas may appear when the inflammatory appearance of the skin becomes accentuated Inflammatory carcinoma oc urs on the aver age at an earlier age is much more rapid and the whole picture is one of an acute ful minating process

7 *Paget s disease of the nipple (dermatitis maligna)* The skin lesion in Paget s di ease involving the nipple areola and surroundin skin presents a reddened granular surface discharging a yellow viscid fluid At times the appearance is that of a chronic eczema with encrustations The lesion i frequently confined to the areola alone and the nipple disappears as the disease progres es In our series the inflammatory symptoms never began in or about the areola Pa et s dis ease is unilateral while the inflammatory



Fig 9 Cas 14 Y S La ge art ry n sub t ne u f t t e filled w th tum r cell th omb from mas 1 l ft b t



Fig Cas 15 M B Primary ope ble flamma tory carc oma ght b st Left b st b inn g to be t l ed (Black mark c used by adh si e)

type of carcinoma is often bilateral Further Paget s disease usually occurs between the ages of 40 and 60 years

8 Gumma of the breast Adair has recently reported a case of gumma of the breast ob served in this clinic In this condition there is a reddish bronze color of the skin directly over a circumscribed hard tumor which is freely movable No other features suggest carcinoma A careful history and a Wasser mann test will differentiate this condition

PATHOLOGY

Except in a few instances neither mastec tomy nor biopsy has been done hence we are unable to report fully the pathology of the breast tumor In the recurrent cases few pathological reports or slides have been furnished by the hospitals in which the oper ation was performed although every effort has been made to obtain them The findings vary from comedocarcinoma carcinoma sim plex mammary carcinoma invading dermal lymphatics and large alveolar carcinoma to scirrhous carcinoma

The marked variation in the pathological findings raises the questions Is one justified in including these inflammatory carcinomata in a single group? Is it not possible that some additional factor has been added to account for the inflammatory manifestations?

In a few cases a study of the material obtained through areas of skin invasion shows dermal lymphatics everywhere invaded by carcinoma cells This diffuse lymphatic metastasis is the most distinctive microscopic pathological feature of this phase of mammary carcinoma The recent report by Delbet and Herrenschmidt of a case of mammary carci noma which they call cancer (hæmophile) emphasizes the possibility of the spread of the disease through the blood vessels

Ewing has pointed out that the mode of extension when the skin is invaded is by way of the subpapillary lymphatic plexus from the periductal lymphatics Deaver and Mc Farland state that in acute mammary carci noma the lesion is characterized by a combi nation of purulent infiltration and carcinoma tous change in which the carcinoma cells seemed to be diffused in the puriform col lection In the pathological report of Schumann s case the gross appearance on incision was that of a firm tumor in which small abscesses were present The substance of the growth was firm and fibrous and of a purplish red color There were small iso lated areas of hæmorrhage and a gradation from small necrotic spots to abscesses was observed The contiguous skin was œdema tous and indurated

He considers the microscopical picture a complex one and reports it as follows

The main characteristics are those of a medullary carcinoma growing with a small amount of connective tissue stroma inter spersed with groups of closely packed cell nests of a scirrhous type Other fields are



Fig Case 6 M W Large artery filled with tumor cells (stromi s

similar to carcinoma simplex The important feature is the secondary inflammation set up—small abscesses being scattered throughout He does not report on the microscopical pathology of the skin

The pathological picture of minute abscesses throughout the breast described by Deaver and McFarland and by Schumann in acute inflammatory carcinomata have not been seen in any cases studied in our series

Histological structure of inflammatory carcinoma We are indebted to Dr James Ewing for the following report based upon a study of portions of involved skin and underlying tissue removed from Cases 11 15 16 and 17 the axillary mass in Case 8 and the breast tumor from Cases 1 and 14 Results of examination in Case 4 are also added

The main skin lesion is a diffuse permeation of dermal lymphatics and in some instances of blood vessels of the derma and subcutaneous tissue

In Case 11 many of the dermal lymphatics are distended with large tumor cells loose or in coherent clumps and at some places adherent to the endothelium Both lymphatics and venules are involved and in the venules the tumor cells are generally mingled with red blood cells and some lymphocytes The tumor cells show marked degenerative changes including hydropic degeneration swelling and hyperchromatism of nuclei and isolated cell necrosis About all invaded vessels there is a rich exudation of small lymphocytes



Fig 12 Case 18 M F Primary inoperable flammatory carcinoma left breast

In Case 15 both the lymphatics and venules of the derma are distended with solid masses of well nourished tumor cells In some vessels there is no blood but only tumor cells in others the tumor cells are mingled with blood cells while in a few the tumor cells float freely in the blood Lymphocytic infiltration is abundant in many places but is not uniform

In Case 16 there are loose tumor cell emboli in the large arteries of the subcutaneous fat

From these observations it appears that the cutaneous changes in inflammatory carcinoma consist of an invasion of the dermal lymphatics and venules with tumor cells which excite a lively venous congestion and marked lymphocytic perilymphangitis and phlebitis

Pathology of Case 1 Gross pathology The breast is occupied by a hard opaque cicatricial cancerous mass 8 by 10 centimeters which is well circumscribed extending from near the nipple to the deep muscular fascia The mass exudes much yellow fluid The deeper portions are hyperæmic The small remainder of the breast is œdematous and fibrous Three small axillary nodes are hard and white The skin is slightly browned

Microscopic examination The tumor is a very cellular comedo duct carcinoma of a large alveolar structure with extensive invasion of the connective tissue of the breast The cells are hydropic The stroma is richly infiltrated with lymphocytes and is œdematous with granular degeneration of collagen fibrils Three nodes are completely replaced by carcinoma

Pathology of Case 14 Gross pathology The breast is bulky protuberant and firm The skin is scaling and thickened over the entire specimen and over 4 centimeters at the nipple is apparently invaded by carcinoma The nipple is involved in diffuse mass of carcinoma which is continuous below with the main tumor The main tumor is located directly beneath the nipple and presents a firm opaque circumscribed solid mass triangular in shape 8 centimeters across the base Two centi

meters of uninvolved fat tissue separate the tumor from the muscle Axillary contents are missing

Microscopic examination The main tumor is a large alveolar carcinoma from which there is extensive infiltrating carcinoma with very marked fibro is In a few dermal lymphatics the lumen is di tended with large tumor cell The skin is much fibro ed

Pathology of Case 4 was furni hed through the courtesy of Dr Chas H Peck Examination was made by Dr A B Reese Senior Pathologist

Macroscopic examination The specimen con sists of the entire left breast with an area of skin measuring 21 by 13 centimeters This includes the nipple which is not retracted The pectoralis major muscle has been removed separately from the breast The tumor is scattered throughout almost the entire breast In some places it appears to be encap ulated while in others it is infiltrating The tissue is grayish white to pinkish white in color firm and elastic with hard bullet like nodules scat te ed throughout it By squeezing a soft creamy substance is made to ooze out from various foci The axillary contents contain numerous small nodules the largest being about 2 by 1 centimeter On section this is firm white tissue similar to that seen in the breast

The sections show gland (2) non encapsulated tumor and encapsulated tumor

Microscopic examination The tumor is composed of large masses of epithelial tissue growing in struc tureless fashion The tissue is exceedingly cell rich in places 4 to 5 nuclei are seen overlapping each other and growing as one nucleus The nuclei are mostly large vary greatly in size have nucleoli and many mitotic figures are seen There is very little stroma Both the encapsulated and the non encap sulated parts of the tumor are the same The axil lary lymph nodes show metastasis

Diagnosis Medullary carcinoma of female mam mary gland with metastasis to axillary lymph nodes

BACTERIOLOGY

Sections of skin from Cases 15 16 and 17 which were removed under strict aseptic condition were studied bacteriologically by Dr J C Torrey whose findings are reported

The material consisted of segments of tissue about 0 5 centimeters wide and 2 centimeters deep Fatty tissue below the skin as present The sec tions were sent in sealed Petri dishes and were received in good moist condition Cultures were started at once

Media used

1 Aerobic cultures—ascitic agar plates—pH 7 4 blood agar plates

2 Partial anaerobiosis — blood agar (subtilis method) semi solid agar (vitamine) plants just below the surface glucose broth in fermentation tubes



Fig 3 Case 16 Recurrent inflammatory carcinoma of right breast Appearance 6 weeks after radical mastectomy

3 Complete anaerobiosis—deep plants in casein digest agar vaselne cap

Cultures were incubated at 37 degrees C and observed for twelve days

Results Bacteria were not numerous in any case No single type of possible pathogenic organism was found in all cases The following findings are only suggestive

Case 15 A long chain streptococcus was isolated a few colonies appeared on two plates This strep tococcus belongs in the viridans group It causes very slight hæmolysis like the alpha type It does not ferment any sugar (glucose lactose mannit salicin or raffinose) and is peculiar in this respect Morphologically it suggests a pathogenic type

Case 16 No pyogenic organisms were found A strain of bacillus lymphophili which I have de scribed as occurring constantly in Hodgkins disease was recovered

Case 17 Typical staphylococcus aureus cultures were recovered from this case These occurred in considerable numbers on one plate

The only other reference to the bacteriology of the breast in cancer is the report of Monsarrat whose conclusions are not convincing

BIOCHEMICAL

The chemical composition of the blood in cancer has been studied by Theis and Stone The non protein nitrogen urea nitrogen uric acid and sugar in the blood were determined in 189 cases 13 being patients with carcinoma of the breast The conclusions drawn from these studies were (1) Non protein nitrogen and urea nitrogen are low in the blood of cancer patients (2) Uric acid except in cases with kidney complications and 2 cases of melanoma is not abnormal in cancer blood (3) Blood sugar is not increased in cancer

PRIMARY OPERABLE INFLAMMATORY

N	Name	Age	S M W	La	Tra ma	D f 6 ymp m	Firs ymp om	I f adm ssio	C d m t
	H E D Ad ar N 8763		M		N	9	N f le ze f pe bo gpl f rigb b east	5	B fky ov d mas bo rl h pple 5 by 5 by 8 m Bl h f k h h here T m mov bl er ches ll Rigb axillary odes lved
	I L D Le	3	S		N	Apr 9	Lum i pf quad f f igh b ast	6-	T mo rugh brea 6 by 8 cm Breast redd ed d rdema ou k fixed Rigb ll ry od lved
3	C M D Lee	3	M		N	f f	ll rugh br as d pa (la)	7 o-	Wh le ht b east vol ed tumor process h f flamm ory m l men of kin M ss f ax ll y odes fixed N pracla icula vol men
	E E I P k	8	W		N	M	Small mas la lef breas	N	D ff se mass pper ou quadran of lef b t R f bl h th loc f hea Axillary odes palpable N pracla icular volv m

PRIMARY INOPERABLE INFLAMMATORY

5	D N I Lee N 8	39	M		N	F b 3	Larg m oc f mos f rugh b	M 3	T mor f h b as oc pym ⅝ of brea nd m asu 6 by 5 b 3 cm Sk ed d dh re T mor mov fle hes Rigb axill ry nodes involved Rigb acl icula f f ess O ood lef lla
6	L S D Lee N 3 5 8	5	M		N	Dec	L f rm l m h f l f b pa	M	C umsc ibed m l f breas 3 by cm h k 6 ppl traction Sk eddened, pracl lar ful ess on l f d N ax ll y nvolv en
7	M T D Le	5	S		N f	—	ral sm ll od les ppe po of lef b t	Oc 9	Mas ppe q adra t f l f be t Sk flamed d dh re A ll ry odes q firm l f d and on in lef pracla l fossa N ppl ha d pf d d replac d b lar b
8	F K D Lee N 3 7	36	M		N	Aj	Thick l pe port f lef b as	Oc 9	Lef bre high h rugh Diffuse h k g throu hou he breas Patchy dd ing ex d h pos erior axil l y t F rm llary nodes the lef id d in h pracl la fossa
9	R L I Lee N 3 6	6	W	?	N	Dec	Sm ll lump ze f pe l f l fossa h h d l f breas	M y	Ind fin d ted mass me f l f b t h h h vier d larger h ugh P d ange axillary and p acla l odes l ed d one rigb axill

CARCINOMA OF THE BREAST

Chest pl t	P th type	T tm t	Res lt f t tm t	C se	D n bef adm io	D n f adm io	T tal d t	Res lt
N g f pulm y m ta M t t ses pr se	C medo-d t C	F b 9 X ray y l 4 R d m pack M y 9 Rad cal) ma t my Oc X ray y l Dec 9 X ray y l	D l yed b b g Sk l m t Lef b ast lso)) d	R d prog f ll l io ft pe tion	y	y m	3 y m D ed	D ed
6 3 L g ho d m ta t ses		J 9 H V X y A g 9 H V X ray Dec 9 H V X y	R gres ft m d axill y od	T m ecurred P gr p l f l w h m ta tas t k ll	½ m	3 m	y 5½ m	D ed
7 5 N g 5 3 P l m y m tas t ses		J ly 9 H V A g 9 H V Sept 9 Rad cal m ect my lse h M y 9 X ray y l	N d f gr f t m b f re pe tio	R t rn d ft op- ratio h ta eou f io f m as ta t d pelvis R p d d l	5 m	y 4 m	y 9 m	D ed
Nov 9 N g		Rad m tec my (l ft) J 9 3 H V X y Nov 3 R i l mast t my (ght)	S rg ry d sastro	Case prese t po pe case d g badly by d l g y Rec rr y t d se se nts hope l	6 mo	y 3 m	y 9 m D ff se ecu ta ou d t odes	

CARCINOMA OF THE BREAST

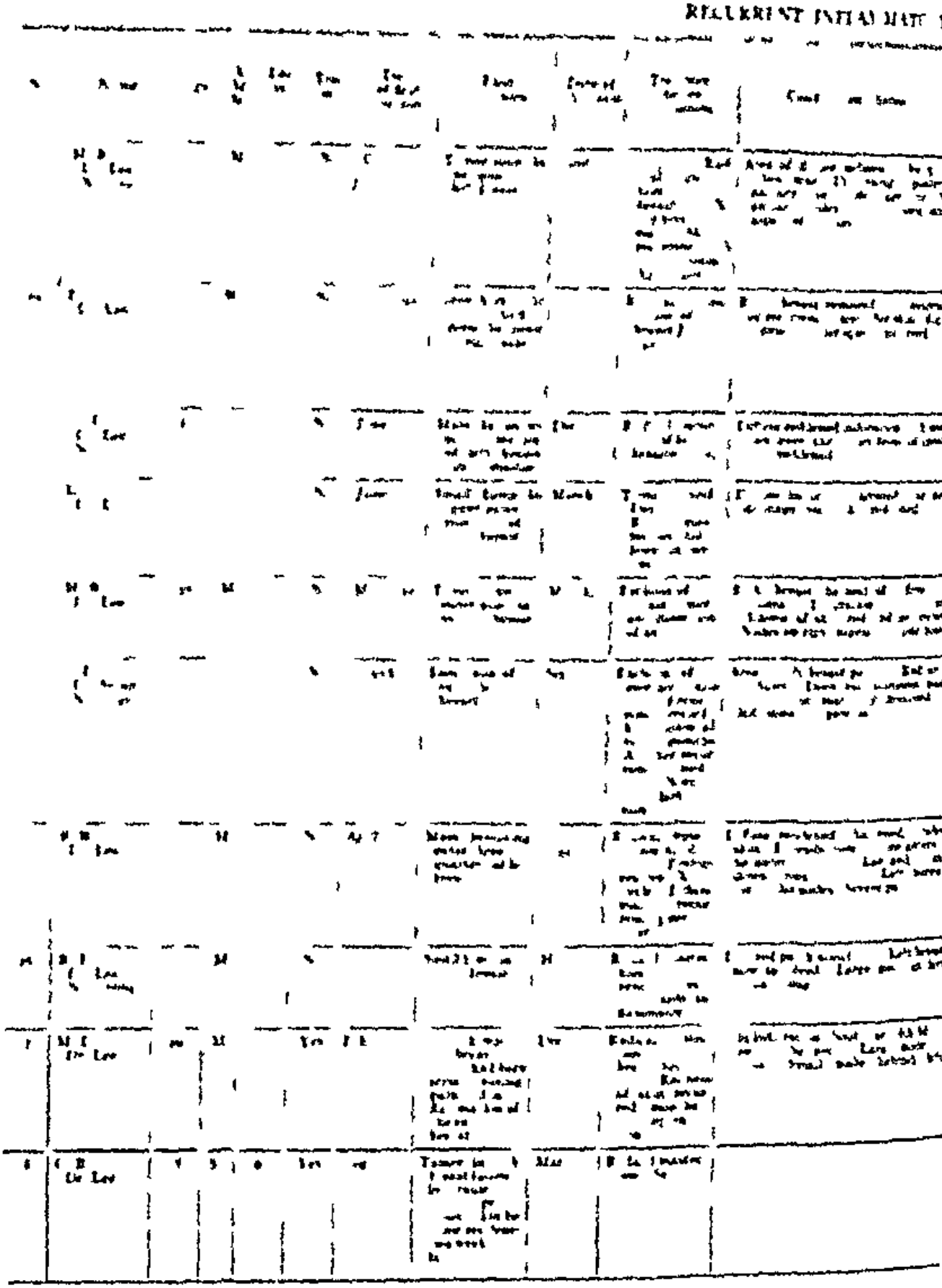
M 9 3, N xlenc f pul m y m ta		M 3 V y l Rad m d les J 9 3 V y l	Dec se t ze f t m	Ul ratio f ght b t Infil ra tion f k T m l f b Nodes i bo h ax llæ	m	y	yr m	Do g poo ly
		M 9 3 X ray l M y 3 V ray ytl Oct d Dec 3 X y y l R d m edles	M k d dec se i ize f b N pa les l raction d fix to f k	S fact ry gres io (w ht Sl gh i as ize f m	3 m	1 m	y mo	Do g w ll
Oc Does no how pul mo ry me as t is		Nov 1 X-ray y f F led t k p ppo tm f tr m	Inc se i ze of b d f ease f lcera t	Ch mic l mov l l ssed b f sed	y	4 mo	y 4 m	D i g poo ly
Oc 9 Neg f me l ae 9 ome re bron hus l fil ra b no def evide t me ta is Dec 9 g	V 6 C rct ma impl l f llary nod	Oc 9 V ray l Dec 9 X ray y l f b 9 3 R d m edles V ray ytl J 3 V Dec 3 V-ray ycle	C d rabl d m ir lze f bre Axillary an l racl ic la odes small	M as ic od les ki l f br k l em t h ded l f pr ta ic la fossa nd l f la l bes wall	6 m	y m	y mo	Loc l nd ion f ir Ge ral co d tion ood
J 3 M axis prese i bes pla		M X ray y l l b V ra y- l R d m edles M d l ne 3 X-ray ytl	R gres ir l ma l f b V M ca no be pal a l M)	Lef br bec m bl ed wi h so t eck d odes d from lavicl ma kl y face nd rra be me ord matou ma ked dysp- ea. I h	6 mo	yr mo	y 7 mo	Died

PRIMARY INOPERABLE INFLAMMATORY

N	Nam	Ag	S M W	Lac t	T m	D t f first ymp m	First ymp m	D of dmission	Cond tion admission
	C W D Lee N 376 6	3	M		Yes (?)	J 9	Lump size f pe in q adran f ght breas	J ne 9	Right breast larg nd heavy with slight ppl traction. Pig-skin ing near ola bel w h h ther is disc id mass h cm H rd odes from tail of breast ax lla. F lness in infraclavicula fossa and questio bl odes in supraclavicular fossa
	R E D Lee N 88 4	3	M		N (A g J bs ess f igh b ea t ed)	J 9	Lump th size of bea the scar (Recei ed an] tic tre tme t for year)	Mar 9	Sk lesio involvi g inner third of left b east Alt of rich breast t lavicle and po er scapular lin Bo h breas heavy full and indurated. Both arilla sh metastatic nodes
	A P D Le	34	W		N	March, 9	Lump th ize f ol e in th righ breast	J 9	Right breast large d hard throughou Multiple nodules and redness in sk B east mo ble Large nod in right axilla d mall in ight praclavic lar regio
3	A W Dr Lee	44	M	6	N	April, 9 3	N tic d l ft breast was hard d nippl was retracted	N 9 3	Left breast large reddened and hot h d rmess Surrou d g sk p k Def init th kening in uppe middl segment, 5½ cm in diameter Slightly adherent to kin Larg odes f axilla and on praclavicular left id
4	S S D Le N 3 86	5	M	6	N	March 9	Mass in lef breast	Ap l	Lef brea t la t ic th size f h and reddened h t and ender Impression th whol breast is volved in ca inoma Large mass f odes in right axilla nd everal l f and N praclavicular involvemc t
5	M B D Le N 9378	56	S		N	Nov 9 5	Thickening in right br as	J 4	Whol righ breast occupied by d ffuse mass and th kin i h p rplish red color C l sharply defined. Left breas is pink Hard odes in each axilla. N praclavicular in lvem t
6	M W D Le	6	M		N	Oct 3	L mp i lowe inner quadra t of left breast size f walnu t. Tw mo ths lat kin becam red	Jan 9 4	Lef breas markedly edd ed and occ pied by ill-d fined mor Nipple retracted Bl sh ends to pos ior axillary line Lef axilla as vely involved N supra lavacula involvc me t
7	M H D Le N 304 5	9	M	3	N	A g 9 5	Small ppe po tion f righ breast	Jan 9	Righ b as enl rged d firm i h id re f ldenin and infiltration of sk ext ding scapula and ver on th lef bre and gh rm Larg odes in each axilla d righ upraclavicula fossa
8	M F D B L C l y	6	M		N	April	Nod le i l f breast and axilla	Mar	Whole lef breas m kedly reddened d oc pi d by an ill-defin d tumo Skin hick ed mall langiectases presen B eas mov ble Supraclavicular odes l ft id in lved Redness ds p ver l f el vic) Slight bl sh over inner aspec of right breast

CARCINOMA OF THE BREAST—Continued

Che t plat	F th. type	Treatment	Result f t eatm t	Course	Durati		T t l d tio	Result
					bef re dm io	ft admis		
J 9 Sept 3 Chest plat g f m t tas		J 9 X y y l A g 9 y Oc 9 H V Dec 9 H V Oct 9 3 H V	Exc ll t gres N mo an be palpated Small od ight axilla	P t t h w d ll gres Th rape t bo Oct ccou f b t di io	9 y	y 8 mo	y 8 m	y 8 m Do s w ll
M h 9 Chest pla g J Plat pos tv f m tastasis	N 3878 M mm ry arc oma j di g lympha ics l h d ma	M 9 X y y l j 9 y y l M d Ap l H V J ly 9 H V A g 9 H V	Mos f r rfi ial ed filtra io has disappe d Nod p ese t	By Nov most f th lesi h d d sap pe ed An l t ic t m t ed Sh w d g f bdomu l m ta ta A g 9 B t di io ll t D d S pt 9	9 m	y 6 mo	y 3 m	D d
J 9 Plat f l gs h wa d nc f me tasis		J 9 X ray y l July 9 H V	N gressio	Rap d f l Death J 9 3	3 mo	7 mo	m	D ed
Dec 9 3 N evid f m tas		Dec 9 3 X y y le	Too ly t ec rd any res lt		7 m	m	m	Too ly t ec d y results
Bl y 9 Ch t pl t g	N 6 58 Al eola rc m h rv nfil tra io Derm l lymph ic fill d ith l rg tumo lls	Ap l J A g Oc \ ray y les Nov 9 m tec my Dec 9 R d m dles ight b t	J ly 9 Lef b as mall nd les dd d G w ght	D d f l well f se lm th Dec ight breast l ed M tas t l mba pun S p acla ic la od vol ed D ed J 9 3	m	y m	yr mo	D ed
Jan 9 Ches pla g	N 7 1 Sk h wa t nsi asio f bd rmal l mph ics Blood l fill d h masses f anc ll	Jan 9 4 H V	Too arly to ecord any es l		4 mo	mo	6 m	Too ly t ec d any l
J 9 E la g d nodes i igh hil m	Loose l mp f cancer ll large t es d lymph tics f k	J 9 X ra ycle	Too arly record y res lt		4 m	mo	6 m	Too ly t reco d any re ults
		N ne		Disease too f ad anced to tr	6 mo	mo	8 mo	Disease too f ad anced to treat.
M rch Ches pla hows evidenc of m ta tasis		Sept Radium lse h re	Disease dvanced rapidl Too far d vanced for furthe th rapy	R pid decline, Dea h J ne 9	mo	3 mo		Died.



CARCINOMA OF THE BREAST

Ch t pl t	P h type	T tm t	R lt f t tment	Co rs	Durati		T tal d t	Res t
					bef dmis io	ft dmis		
J M tasta is l gs		J 9 S pt 9 X y y les S pt 9 R d m pack X ray y l	\ l f from pa \ m d m io d f k R pid ecurre l 8 w k f mp m t	R p d xt io f pulm y m ta t se B e m ta ta is t rom d f lvi	m	5 mo	yr 4 m	Died
Sept 9 3 Lu g h w probabl rc m m ta ses		M 9 3 X y l A g 9 3, X y y l (F uled k p ppo men)	Littl palliat	P sc l f pra la icul f l ss sed Operat h w sed ed w th l io D d F b 9 4	y	y m	y 4 m	D ed
Dec 9 3 Lu m t prese t		Oct 9 3 X y y l Dec 3 X ray	Sk d d	P l ft rm M t p g pa ralysi	y 8 m	m	y 9 m	Die l
April 9 La g nod i ugh h l m		M X y y l M y Dec J F b \ y	M h 9 N vaden f dise se	R ght lla y od d p l ic l fossa R h eck as p lly being l ed	m	y m	y 9 m	D g poo ly
M rch 3 Ch pl f m ses J 9 3 g		M M y J J ly 9 H X	N pallia res l	R p d progr f d se Llc ra io f sc d œd m	m	6 mo	y 4 m	D d
Se 9 N vid f l g m t		Se t N 9 M 9 J ly 3 X y Sept 3 X ray y l	R g es f od les d l g p f k	Red f k rred I flam m t y p oc ss i ght b t has begu d t be roll d	4 y	y 3 m	5 y 3 m	O gin l lesio is f ly w ll trolled
Oct 9 3 E d nc f l g m tase	Sc rrhou rc m	Oct 3 X y y l	Li tl mpro me	R p d progres f ympt m foc l d g eral	6 m	4 m	m	Do g badly
M Lu g me ta Prese		M y X ray y l	X improv me t	R pid decl	5 y	mo	5 y m	D ed
Dec 9 Ch pl howed me is		Dec 9 3 X y y le begu	Ins fficie tre m g	D ed f sc l t fev F b A top- y purul pl P rac d is sepsi R po from no ber hosp l	m	m	m	Died
Mar X evidenc of pulmon me ta		X-ray lse he		R b d pelvic m ta ta H peless se	6 mo	mo	7 mo	H peless se

The [illegible] Cases 4, 25, 26 and 27 was studied by [illegible] The [illegible] treated [illegible]

Case	[illegible]	[illegible]	[illegible]	[illegible]
4	23 9	41 9	4 8	141
5	6	14	2 2	
6	5 1	9 1	3 6	113
	1	18	4 4	116
[illegible]	3	27 1	4 6	17
[illegible]	4	11 3	3	17

The [illegible] in these 4 cases [illegible] the [illegible] and [illegible] cancer patients in general [illegible] part [illegible] that [illegible] in the [illegible]

[illegible]

Our attention was called to the [illegible] mammary disease when we [illegible] rather a [illegible] immediate recurrence [illegible] ing a [illegible] al operation [illegible] that time [illegible] repetitions of this experience in cases [illegible] elsewhere have made us more certain as to the [illegible] of surgery in the treatment of this disease. The explanation [illegible] failure probably lies in the *diffuse* invasion of the dermal lymphatics. [illegible] most any line of incision passes directly [illegible] invaded lymphatic vessels and veins with no barrier to prevent immediate recurrence [illegible] through several lymphatics or blood vessels.

Here then is a distinct clinical group in the field of mammary cancer [illegible] usually treated surgically with an [illegible] immediate and extensive recurrence and a rapidly *fatal result. We believe that operation has been displaced for all time by radiation, unless some more efficient treatment than radiotherapy shall be discovered.* This holds good even though the anatomical setting of the case is an operable one (i.e. a movable tumor in the breast with a few nodes in the axilla).

In the majority of cases external radiation by the low voltage machine has been employed under the direction of Dr. [illegible] the [illegible] of the Hospital. The [illegible] treatment consists of [illegible] a peak voltage of 135,000 to 140,000 volts [illegible] milliamperes of current [illegible] of [illegible] Over the breast and [illegible] a time of [illegible] are [illegible] with a time of [illegible] The [illegible] in each instance [illegible] individual patient. The intervals between treatments [illegible] treatment.

The course of treatment is repeated [illegible] [illegible] Treatment [illegible] the condition of the skin [illegible] further radiation.

In those patients with large [illegible] very satisfactory [illegible] has been obtained by the use of [illegible] voltage. Two hundred thousand peak volts are employed with [illegible] milliamperes of current [illegible] of [illegible] millimeter [illegible] The time of exposure is usually [illegible] with a time interval between treatments of several days. In such a case [illegible] may also be used [illegible] disease beyond the confines of the breast.

Radium as an external agent has seldom been tried as the response to X-ray has been so uniformly satisfactory. Experience may ultimately show that external radiation over the breast proper may be still more effective when radium is employed because of the shorter wave length obtained. In one or two cases the introduction into the [illegible] of radium needles with a filtration of 0.5 millimeter of *platinum* combined with X-radiation externally has given excellent primary regression.

At present our main reliance in coping with the condition must rest upon well planned X-ray treatment. The danger of over radiation must always be borne in mind, especially when higher voltages are employed.

RESULTS

Of the 28 cases under report 14 are dead and 3 have been observed too recently to arrive at any conclusion as to the results of treatment Of the remaining 11 patients 4 are doing well while 7 are succumbing to the disease The average duration of disease after admission to the hospital is 8 3 months while the average total duration of the disease in all 28 cases is two years

Patients that do best by radiation are those who have had no previous surgical intervention therefore the primary cases have yielded the better results Of the 18 primary cases *followed the average duration after admission* to the hospital was 10 7 months whereas *the 10 recurrent cases gave an average duration* of but 7 3 months Two of the primary cases 6 and 10 presenting menacing symptoms at the time of admission have done exceedingly well under radiation treatment One of these is now in excellent health 14 months after admission while the other is in good condition 1 year and 6 months since our first observation In both instances *there has been a decided gain in weight with* no obvious extension of the disease The most striking improvement is exhibited by regression in the tumor itself as well as in the inflammatory phenomena

Treated by well planned radiation these cases live for 1 or years which is certainly more than any surgical treatment alone or combined with radiation can offer Moreover the patients are much more comfortable under the conservative plan of treatment

CONCLUSIONS

1 Inflammatory carcinoma appears to be a distinct clinical phase of carcinoma of the breast

Generally this type has been unrecognized *being frequently mistaken for other* diseases of the breast

3 The inflammatory appearance are characteristic

4 This variety of mammary cancer shows no constant pathological type

5 The most striking pathological change is a wide invasion of dermal lymphatics by carcinoma

6 Bacteriological and biochemical studies have failed to explain the inflammatory manifestations

7 The cases do badly if treated surgically

8 At present radiation *offers the only* hope of palliation diminishing the patient s suffering and giving a definite prolongation of life

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A NEW METHOD OF RESTORING THE LUMEN IN A CASE OF IMPERMEABLE STRICTURE OF THE ŒSOPHAGUS

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TO the general dissemination of the knowledge and the technique of examining the œsophagus must be attributed the large number of case reports of stricture of the œsophagus and the early attempts at alleviating a very distressing condition The large majority of cicatricial strictures of the œsophagus are the result of the accidental swallowing of some corrosive acid or alkali and it is probably the general popularity of the various cleaning mixtures containing these corrosive substances that accounts for the large number of cases of stricture In a report issued this year from the Bronchoscopic Clinic at Jefferson Hospital Philadelphia Dr Louis Clerf records 20 cases which have been entered and treated during the past 2 years In each case the stricture was the result of accidental ingestion of some cleaning mixture

The site of a stricture of the œsophagus varies and the method of treatment depends at times on whether the stricture is located at the upper or lower end of the œsophagus or in the middle œsophagus In some cases more than one stricture is present situated at different sites If ordinary œsophagoscopy with bouginage is indicated and the stricture is amenable to this treatment the site of the obstruction is not so important but a stricture which completely occludes the lumen of the œsophagus and resists all efforts at bouginage is best and most safely treated if the stricture is located at the upper or the lower end For in a true case of complete occlusion of the œsophagus at the lower end it is possible to do a gastrostomy and get an exposure of the œsophagus for a direct view of the stricture In a complete stricture located at the upper end an exposure of the œsophagus to external surgery entails no great danger to the patient The external surgical treatment of strictures of the middle œsophagus however is fraught with great danger The technique is very difficult and up to the present time the mortality has been exceedingly high Probably the further development of external surgery of the œsophagus will solve the problem of treatment of impermeable strictures of this area but until this evolution occurs we can only continue our efforts to make the treatment through the œsophagoscope more painstaking and more free from danger

With the hope of adding something to the technique the following is offered in illustration of a method of restoring the lumen of a completely occluded œsophagus in the thoracic portion with less danger to the patient

A review of the literature dealing with strictures of the œsophagus reveals comparatively few cases which are truly impermeable Very many cases are referred to as impermeable which fail to respond to ordinary bouginage but which later are passed by the string swallowing method or retrograde bouginage or some other method which discloses the fact that the strictures are not really impassable It was a surprise to learn that complete occlusion is so rare Hence a brief resumé of the cases recorded will probably be of value at this time

Chevalier Jackson in *Peroral Endoscopy* states Strictures of the middle third of the œsophagus are not amenable to treatment by any means at present known and the patient will have to be satisfied with gastrostomy until transthoracic œsophagotomy has been fully developed The same author in *Bronchoscopy and Œsophagoscopy 1922* states Impermeable strictures of the middle third of the œsophagus have not been successfully treated by surgical methods

A few months ago a case of stricture of the œsophagus in the middle third was reported from the Bronchoscopic Clinic at Jefferson Hospital in which a perforation was made in the stricture by means of manipulative dilating combined peroral and retrograde œsophagoscopy Unfortunately the child developed measles and bronchopneumonia and died

Dr J Murphy and Dr Samuel Iglauer in *Transactions of the American Laryngological Rhi*

nological and Otological Society reported a case of complete occlusion of the lumen in the middle œsophagus in which they attempted to restore the lumen by means of the electric cautery The peroral endoscopist used the cautery while observing the light of the retrograde œsophagoscope as a guide Following the operation the patient was able to swallow but 14 days later he succumbed The cause is not known

Cussenbauer in *Zeitschrift fuer Heilkunde* 1883 iv 33 described a method of curing impermeable stricture of the œsophagus in the thoracic region and Carl Bayer in *Prager medicinische Wochenschrift* 1894 xix 39 reported a case treated by this method The technique consisted of exposing the œsophagus down to the thoracic aperture and pulling it up as far as possible After making an incision into the lumen a small knife was inserted and pushed blindly down into the stricture and gradually by the use of the knife and a small metal bougie the lumen was restored The patient recovered and was under observation for 4 years

In the *New York Medical Journal* 1890 li Dr F Lange reported a case of stricture 5 centimeters above the diaphragm He stated that by constant manipulation from above and below a small whalebone bougie passed through the stricture from above down

H M Taylor in the *Charlotte (N C) Medical Journal* 1901 described a case of impassable stricture of the lower end of the œsophagus in which he restored the lumen by forcing a small whalebone bougie through the stricture and by afterward cutting the stricture by the Abbe string saw method

Honigman in *Jahresberichte der schlesischen Gesellschaft fuer vaterlaendische Kultur* 1900 lxxvii 41 presented a patient who had been operated upon In this case a stricture was found just above the cardia which resisted all attempts to pass a bougie By passing what he terms a hollow bougie down to the stricture he was able to push small celluloid probes through the stricture After this was done the patient gained 10 pounds in weight in a very short time

In the *Revue de chirurgie* 1912 xlvi H Vlamartine and L Sargnon report a case in which the œsophagotome was used successfully The patient lived 4 years A second case in which the œsophagotome was used is reported as resulting fatally for the patient a child of 4 years

Herman Fischer in SURGERY GYNECOLOGY AND OBSTETRICS 1911 xii reported a case in which he performed a transthoracic cardiotomy in a boy of 6 years in whom every attempt at restoring the œsophageal lumen had failed The result of this piece of work was not determined because the child died after the completion of the operation through some unfortunate accident to the anæsthesia apparatus

Dr Willy Meyer presented a patient with a complete stricture of the œsophagus at the New York Surgical Society about the year 1903 In this case he made an osteoplastic flap of the ribs for gastros

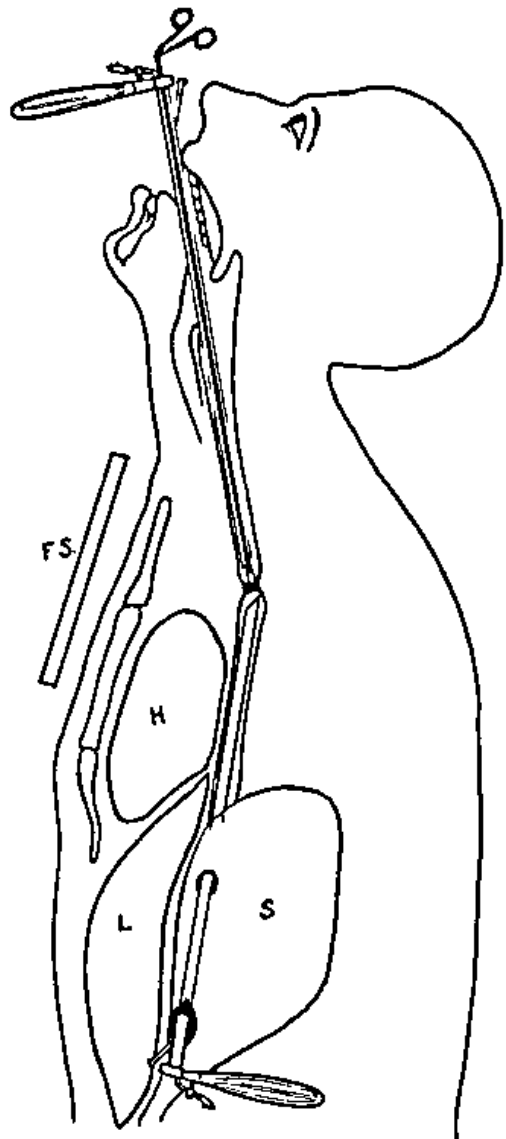


Fig D diagram presenting roughly the relative position of the œsophagus and fundus as well as the fluoroscopic cardia above the patient's left breast and stomach

tomy pulled the œsophagus upward along with part of the stomach and through this excellent exposure of the œsophagus and stomach attempted to perforate the stricture which was located just above the cardia In spite of all efforts the manipulation failed

The literature concerning stricture of the œsophagus is voluminous and it is possible that the aforementioned case do not represent the entire number reported However I have searched carefully for all reports of impassable stricture and I am inclined to believe that they are rare and that probably they will become more rare as our knowledge of the subject increases At least these cases

serve to establish the point that adequate means of handling strictures of the middle third of the œsophagus are wanting

The case which I wish to present had a complete stricture of the thoracic portion of the œsophagus and I was able to restore the lumen by the method herein described —

G T age 24 entered the Cincinnati General Hospital by way of ambulance from Dayton Ohio on August 11 1922 Her condition was grave temperature 97 degrees pulse 60 respiration 24 She was greatly emaciated and in dire need of fluids Water and food were administered by rectum immediately The history of the case revealed the fact that on January 17 1922 in a fit of anger following a quarrel with her fiance the patient swallowed a mixture containing two tablets of bichloride dissolved in a small quantity (2 ounces) of lysol She was given milk to drink a short time afterward and vomited She was rushed to the hospital in an ambulance at Rockford Illinois where she was living and on arrival there the stomach pump was used During a sojourn of 11 days in the hospital she was able to swallow only a small amount of liquids but refused further treatment and went to her home at Dayton Ohio Here she was under the care of her family physician who tried to dilate the œsophagus with a bougie and a rubber tube but was unsuccessful She grew worse and was removed to the hospital at Dayton on April 15 At this time she had lost much weight and was unable to swallow any thing except small quantities of water At the hospital a surgeon made various attempts to dilate the stricture but was unsuccessful and on May 2 a gastrostomy was performed On July 1 she was dismissed from the hospital with the gastrostomy wound open and informed that the restoration of the œsophageal lumen was impossible Shortly afterward the tube was removed and the gastrostomy wound allowed to close after which she found she could not swallow anything She remained at home without fluids of any kind for 3 or 4 days before she came to the Cincinnati General Hospital On the day following her arrival here the gastrostomy wound was reopened and a tube was inserted by Dr Carter A few days later an X ray and fluoroscopic examination by Dr Carl F Little revealed the following Fluoroscopic examination of the œsophagus of G T shows a complete stricture at about the third interspace No barium passed this point in spite of repeated efforts at swallowing X ray plate of G T reveals a complete stricture of the œsophagus at about the third interspace There is considerable pouching above this point A few days later the patient was placed on the table and an œsophagoscope was passed revealing a stricture about 8 cm in the incisor teeth All attempts at bouginage were firmly resisted A small Moshe œsophagoscope was then inserted into the œsophagus from below but to no avail as the smallest bougie found firm resistance

The patient's general condition improved very much with the gastrostomy feeding and about 10 days following her admission to the hospital an attempt to restore the lumen was decided upon The patient received a hypodermatic injection of morphine sulphate gr 1/4 with atropine sulphate gr 1/150 The stomach was washed thoroughly and emptied by means of suction until all fluids returned clear A Jackson medium œsophagoscope was passed from above and a small Mosher œsophagoscope passed from below With these two instruments in position the patient was removed to the fluoroscopic room where under the guidance of Dr Carl F Little roentgenologist in charge the two œsophagoscopes were brought into alignment under the fluoroscope Long biting forceps were then pushed downward through the upper endoscope on to the stricture which appeared to be one half to three quarters of an inch in thickness By means of biting and pushing under close observation through the fluoroscope the forceps passed through the stricture into the mouth of the retrograde œsophagoscope Dr Kuhn who maintained the lower instrument in position saw the forceps enter The instruments were removed immediately and the patient was put to bed under close observation No untoward symptoms having developed an upper œsophagoscopy was done the next day and a small filiform bougie on which a string had been securely fastened was passed into the stomach The string was recovered from the stomach immediately and the bougie removed Further dilatation was accomplished by means of small metal bougies run in series on the string from below By the end of November it was possible to pass a No 40 French bougie from above downward The gastrostomy wound was allowed to close at this time as the patient was taking all her food by mouth Around the middle of November she was instructed in passing the bougie on herself and when she had accomplished this to our satisfaction she was discharged from the hospital She had gained about 100 pounds in weight and has had no difficulty in swallowing any food She continued to pass the bougie twice a week

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A BRIEF REVIEW OF THE LITERATURE OF OSTEOMALACIA WITH THE REPORT OF A CASE NECESSITATING DELIVERY BY CÆSARIAN SECTION

By EMERSON L STONE M D New Haven Connecticut
F m th D p tm t f Ob t t d Gy ec l gy Yale S h l f M d m

OSTEOMALACIA representing in the minds of some observers a small but distinct chapter in osteopathology is generally said to be extremely rare in English speaking countries Whether or not this is strictly true is an open question but the fact that it rarely engages the attention of the obstetrician is reflected in Williams series of only three cases and his quotation of an equivalent number in the clinic of Tarnier in Paris and in that of Hirst in Philadelphia

Recently I have studied a patient in whom delivery by cæsarean section was necessary because of the deformity of the pelvic bones resulting from osteomalacia My interest has stimulated me to review the literature upon the subject and to present the information which I have gathered in the hope that it will prove of value to surgeons whose field of study falls in the domain of obstetrics and gynecology Excellent case reports have been published by Edelmann Porges Zak Mangum and other observers but because of the apparent rarity of osteomalacia in this country I have described my case in detail and have included several X ray studies which show the bony changes peculiar to this disease

The whole subject of bone diseases has been admirably treated and brought up to date by Locke whose article may well serve as a basis for a study of the known facts regarding osteomalacia

The disease in question is generally considered to be acquired runs a chronic progressive course with remissions and exacerbations is most commonly seen in female adults particularly as a complication of pregnancy and the puerperium is clinically characterized by muscular weaknes pain and deformity and pathologically by softening bending and fracture of the bones

In contrast to such a specific conception Bernard regards it only as a symptom complex and says One cannot consider osteomalacia a morbid entity due to a sole and constant cause it is rather an anatomical clinical syndrome corresponding to the osseous decalcification He adds Osteomalacia and rickets may be the same syndrome in varying degrees of intensity and in different localizations but having the same anatomic substratum—decalcification combined with reaction on the part of the osteogenetic elements of the bone marrow Jones and Lovett define osteomalacia as a symptom common to most diseases of deformed bone The many points of resemblance between this syndrome and other simular disease complexes involving the osseous system render this viewpoint worthy of more than passing consideration Von Recklinghausen after many years study of osteopathology announced in 1910 his failure to draw a complete distinction between osteomalacia and rickets De Biehler s report of a severe case of rickets followed by progressive softening with fractures and death at fourteen months—serves to illustrate the border line status of this phase of the problem and the presence of many outspoken cases of early and late rickets during the recent epidemics of hunger osteomalacia is similarly important

Dieffenbach in X ray studies has frequently found the lesion in cases of so-called chronic rheumatism and arthritis and Koch describes abortive forms in localized areas

The geographical distribution of the disease is fairly definite It is most commonly seen in Italy Germany Switzerland and India particularly in certain valleys and pecified locations Because of the frequent coincidence of goiter in these sections some observers notably Hoennicke attempted to correlate the bony lesions with an endocrinopathy of thyroid and ovarian origin but

from an experimental and clinical viewpoint ineffectually Few out poken cases have been reported from the United States and it is even more rarely seen in England Japan and Finland (Saltzman)

Because of the striking association between osteomalacia and pregnancy a puerperal form is described Since this type includes the great majority of all cases it follows that males are relatively rarely afflicted the number of the latter being variously estimated from 2 to 10 per cent The non puerperal form affects the sexes about equally and the process is usually less severe more generalized and runs a slowly progressive course The pelvis ordinarily suffers to a lesser extent

Juvenile forms have been described by Averzer and Mosho but Zeris and others present evidence for a possible confusion with rachitic changes while the so-called senile osteomalacia described by Weis Looser and Duschak has been questioned by Drasche and compared by Schiffmacher to a less complex osteoporotic process

Heredity is generally thought to be a negligible factor in this disease The average age incidence is placed by Scott at about 30 years while Baetjer and Waters place it at a later period It is apparent that the age limit must be somewhat restricted because of the frequent association with the child bearing function Multipare are much more often afflicted than primipare and Guthrie s figures place the average incidence between the third and fifth pregnancy The fact that the occasional case under 20 years is apt to occur at puberty again calls to mind the probable relation of ovarian function to the underlying disease process but on the other hand Moloho points out that in childhood the sex incidence is about equally divided

Diet is undoubtedly a factor in the production of the disease but experimental production of the lesions by dietary regulation alone has not been uniformly successful In the more recent foreign literature however considerable study has been given to a syndrome characterized as hunger osteo-malacia differing little if at all from the classical forms of the disease (Hirsch) except in the more frequent affliction of males and elderly people and as pointed out by Edelmann in the variable response to oöphorectomy Dalzell and Chick, and Hume and Nirenstein in a series of cases from Vienna report cures on a basis of dietary regulation alone wherein such supplementary foods as cereals animal fats cod liver oil butter and green vegetables furnished the essential factors Clinically the cod liver oil acted with greatest specificity and the vitamine A constituent of the diet was regarded as most significant Szennes of Vienna in 1921 likewise reports cases of osteoporosis with spontaneous fractures which he attributes solely to dietary deficiency Hoffman by dietary regulation and the ingestion of cod liver oil plus an adequate phosphorus and calcium intake obtained successful results in 23 cases of osteomalacia associated with painful and deforming spondylarthritis Haberer considers the phosphorus to be most essential and Latzko gives it in doses approaching the toxic figure In Warsaw Higier obtained satisfactory results in 70 cases through the systematic administration of vitamine A Cramer and Schuff arrived at similar conclusions in reports from Russia while Heyer noted favorable results in Munich Reichel and Von Struempell made thorough descriptions of the lesions and Alwens has discussed the therapy reaching conclusions similar to those of former observers Brenner by the administration of cod liver oil fortified by a high calcium and phosphorus intake obtained a favorable result in a puerperal case after 6 months of total invalidism The recently discovered dietary factors in other osseous diseases notably in rickets make it quite probable that the perverted calcium metabolism or vitamine imbalance in osteomalacia will soon be better understood

The old theory of circulating organic acids resulting in a solution of the mineral constituent of bone has been abandoned The possibility of a specific organism being at fault (Petrone Arcangeli) has been universally denied although modern radiologists see evidences of an inflammatory change in the bony tissues Marpurgo attempted to reproduce the disease by reinjection of a

supposedly specific organism but with dis appointing results Hutchinson and Patel however quote the interesting fact that in India certain patients suffer from bone fever following pregnancy the lesion affect ing chiefly the pelvis and thighs These patients frequently seek the hospitals asking for cod liver oil The para infectious theory defended by some authorities assume a dis tant focus as the underlying cause of the complex but this remains a theory

An endocrinous etiology has been favored by many Bossi gave adrenalin in large doses on the basis of a supposed adrenal insufficiency, while Hoffman has followed with reports of a good response to frequently repeated injections Both this series and that of Koltonski however who has claimed cures with adrenalin when castration has failed—were supplied with diets adequate in vitamine and inorganic salt content so that it is difficult to give entire credit to any one therapeutic measure Molcho believes in the adrenal complex as a factor in the production of osteomalacia but makes the significant observation that the classic signs of defective function in these glands are usually absent Edelmann favors the symp tomatic use of adrenalin in small doses for the relief of pain

Curschmann in an extensive treatise upon pluri glandular syndromes in osteomalacia associates a hyperfunction of the thyroid with the non puerperal form of the disease The parathyroids however with their sup posedly specific relation to calcium me tabolism have received amazingly little at tention from the experimenters in this field

Sellheim claims a specific inhibitory influ ence of the gonads upon bone growth while Hanau favors a theory based on ovarian hyperfunction and therefore has held out hopes of cure by oophorectomy Fochier Fehling Hellier and others report favorable results from this method of treatment the last observer having followed the cases by repeated X ray examinations However Mc Crudden s later observations to the effect that experimental o teomalacia is not cured by oophorectomy and that cases without ovaries may develop the disease induce him to formulate another etiological conception wherein the ovaries are not held so strictly and solely responsible He interprets the apparent specificity of oophorectomy as due more to its preventive effect upon further pregnancy than to a definite metabolic change so inaugurated He asserts that the increased calcium demands of pregnancy cause a relative depletion which cannot be compensated remissions and exacerbations with repeated pregnancies probably repre senting a physiological reparative effort to keep pace with the destructive process

Experimental metabolic studies warrant the conclusion that this process is not a simple passive halisteresis but an actively accelerated bone metabolism associated with a loss of calcium and a retention of sulphur and magnesium The old bone is destroyed and new is formed the latter being similar to the organic matrix of the normal and the deficiency in calcium phosphate is replaced by magnesium phosphate The decrease of inorganic and the increase of organic con stituents cannot be accounted for by de calcification alone but by the production of an osteoid tissue as well—a view in accord ance with previously established conclu sions Since the calcium loss exceeds the phosphate reduction the anhydrous phos phoric acid—calcium oxide ratio is somewhat high The magnesium and sulphur are in creased to about four times the normal amount the former replacing the calcium and the latter being a normal constituent of the matrix

White states that although in certain puer peral forms the skeletal changes become worse with each succeeding pregnancy there is a tendency to spontaneous recovery when the drain of pregnancy and lactation is re moved especially when calcium and phos phorus are added to the diet in usable form and that the ability to assimilate these salts determines whether the lesion is transient or permanent In the latter case an endocrine imbalance is considered causative Steen bock and Hart demonstrated experimentally that the production of milk made heavy drains upon the skeleton unless the calcium and phosphorus intake was abundant but

that an imbalance of mineral metabolism whereby lime salts are excreted in excess depends in part upon factors independent of the intake The nature of these factors is as yet undetermined

White reproduced the disease in rats by feeding them the normal diet of a species of monkey susceptible to the disease His analyses seemed to justify the following conclusions

The perverted metabolism of calcium and phosphorus may be due

1 To essential deprivation of alkaline salts from the diet (famine type)
2 To a drain of alkali from the normal storage foci
3 To a combined action of a diet faulty in more than its salt content which by the production of acid in its oxidation and by favoring the development of acid forming bacteria causes a drain of body alkali for the neutralization of this acid or
4 To a combination of all these factors acting on the endocrine system and through it altering the inorganic metabolism

The non puerperal forms frequently show evidences of tissue calcification suggesting a similar drain upon the skeletal storehouse of lime wherein the lime salts go into solution followed subsequently by deposition in foci of relatively high acid reaction (stomach lungs kidneys)

The etiology therefore is unknown and it rests in the underlying cause of the metabolic perversion which results in the outstanding symptom—osteomalacia The inadequacy of current theories of etiology is emphasized in the observations of Hutchinson and Latel They point out that in India many individuals and classes subjected to the same environmental conditions climate water supply housing diet etc suffer in no logical or orderly sequence that child marriage and prolonged lactation cannot be alone indicted because these practices elsewhere are entirely unassociated with the disease that practically all cases are found in females whose diet is identical with that of the males and that the disease is common in the upper classes where the dietary is overabundant The Mohammedans are much more commonly afflicted than the Hindus while the diet of the two castes is identical The striking point of difference in the rituals of these two classes lies in the purdah system of the former according to which the women are never unveiled in public rarely leave their houses during the day and always cover themselves entirely with black garments

The pathology of this syndrome termed osteomalacia consists largely in a description of the end results as seen clinically radiographically and at autopsy The soft and friable bones bend and fracture easily the deformities occurring in consequence of natural mechanical forces rather than from any intrinsic tendency The non puerperal type may affect any part but the puerperal modification selects the pelvis primarily The normal pressure relations cause the sacral promontory to fall downward and inward while the ilia are compressed laterally by the inward force of the femora Thus creates the trefoil or clover leaf shape of the pelvic inlet while the forward extension of the superior pubic rami forms the characteristic beaked symphysis Outlet changes are equally constant and result in a close approximation of the inferior pubic rami and ischial tuberosities in contradistinction to the flaring arch of advanced rickets The actual amount of distortion varies with the age the extent of the decalcification and the forces in action over prolonged periods That the pelvis is involved constantly and early is the observation of Hanau who recognizes a physiological osteomalacia of pregnancy from postmortem studies upon early bone changes This fact lends support to the statement that the disease is doubtless more common than has been heretofore assumed

The vertebræ are ordinarily next affected in order of frequency the individual involvement resulting in a total shortening which causes an apparent elongation of the arms and an actual approximation of the ribs and iliac crests Scoliosis with ex

geration of the normal curvatures is the rule Thoracic deformities do not conform to any type but a decrease in the antero-posterior diameter due to a depression of the sternum is common Finally the femora and tibiæ are involved showing irregular and bizarre bending at times with or without fractures The epiphyses are not affected The skull is rarely involved unless by a diffuse thinning while flattening of the fontanels may or may not be present as a result of efforts at rising The joints and muscles may show atrophy with or without ankylosis in the former and fatty degeneration in the latter There is no constant alteration in the endocrine glands or viscera

The actual osseous changes affect both cortex and medulla Decalcification causes a reduction of 50 per cent or more in specific gravity and the consistency is such that the bone can be easily cut with a knife leaving a yellowish or hyperæmic surface The periosteum is thickened adherent and hyperæmic resembling the changes seen in Paget's disease but in contrast to the unchanged periosteum of ostitis fibrosa The subperiosteal tissue is characterized as pulpy and the cortex is narrowed with thinning or absence of the trabeculæ Decalcification is prominent The marrow spaces are enlarged and sometimes cystic If the essence of the gross pathological alterations were to be summarized in a phrase—it could best be characterized as softening without hypertrophy and since fragility usually precedes the softening spontaneous fractures are early and very suggestive of the diagnosis

Von Recklinghausen von Pibbert Tashiro and Schmidt have contributed fundamentally to the histological study and the accepted picture represents a primary decalcification of the lamellæ where they are crossed by the perforating canals leaving a zone of osteoid tissue rich in osteoclasts and formed of proliferating medullary membrane as well as periosteum Secondly this osteoid tissue is in part a formative reaction resulting from the laying down of uncalcified new bone

The symptomatology of osteomalacia is only definite in the late stages and consequently it is rarely recognized in the beginning The onset is gradual and irregular but most authors place emphasis on the rheumatoid pains tendency to fatigue and difficulty of locomotion prior to the appearance of deformities this syndrome being frequently confused with rheumatism or sciatica The pains are of variable intensity and are aggravated by movement or pressure In the case of women pelvic pain is ordinarily first noted while male patients show vertebral involvement early and in childhood the extremities are predisposed Hahn asserts that pain upon lateral compression of the thorax with exaggerated pain upon release of pressure is a constant early symptom In vertebral involvement girdle pains may be present or even symptoms from compression of the cord with disturbed reflexes altered sensation tremors and occasionally paralysis Muscle spasm is the rule and mobility is voluntarily restricted The gait is shuffling and the patient is disinclined to lift the feet In early life there may be some confusion with rickets but the epiphyses are uninvolved Deformity may be early and manifests itself in diminished height thoracic alterations arched clavicles pelvic compression or anterior bowing of the legs Fractures contractures ankylosis distortion atrophy and cachexia are late symptoms and are usually associated with secondary functional or constitutional disorders

Blood changes are inconstant and not characteristic Mild leucocytosis and secondary anæmia are seen while an occasional relative increase of myelocytes and eosinophiles is reported by Ichihorst Blood calcium is likely to be increased and Scott has reported a slight increase in urinary calcium with a relative deficit in pregnancy and lactation

The diagnosis rests largely therefore upon the symptomatology as described with due consideration of the age sex relation to pregnancy and the nature of the deformities The one outstanding aid in a correct interpretation lies in the X ray findings The bones are abnormally indistinct and poorly differentiated from the surrounding

soft parts Their contour is irregular with variable curvatures due to an irregularly thickened periosteum The rarefied cortex is smooth but thin with destruction of the trabeculæ Long striated areas parallel to the shaft are due to absorption Reparative processes are practically never seen Small benign cysts may occur in the pelvis long bone metacarpals and phalanges Fractures especially of the ribs are common with no table absence of callus formation The marrow cavity is expanded The vertebræ show decreased density with diminution of the vertical height and with or without cupping The epiphyses may share in the generalized rarefaction but the joints are altered only by secondary changes in the weight bearing surfaces

CASE REPORT

A twenty year old American negress who had been married 2 years was first seen in the tenth month of her first pregnancy Menstruation began at 15 years maintaining a 28 day cycle and lasted about 6 days usually with an associated dysmenorrhœa The last menstrual period was June 6 1922 and the expected date of confinement March 13 1923 Throughout the pregnancy the patient's general health was good occasional vomiting in the early months slight headache and chronic constipation being the only subjective abnormalities elicited

The patient's mother died of cardiac disease of an unknown type otherwise the family history was irrelevant

The past history is of particular interest because of the time relation between previous infectious diseases and the development of the bone changes Mumps whooping cough and chicken pox in early childhood are recorded However the general development was normal and there was no clear history of early rachitic changes There were frequent attacks of sore throat and tonsilitis but no history of acute rheumatic fever

In October 1918 at 15 years of age the patient was admitted to this hospital with influenza and bronchopneumonia These diseases ran a typical course ending in an apparent cure but the general physical examination brought out two points of interest (1) the heart showed a short low pitched systolic murmur followed by a faint diastolic murmur in the pulmonic area and accompanied by a marked accentuation of the second pulmonic sound while (2) no mention is made of any demonstrable skeletal alterations X ray observations were not made The physical examination was necessarily superficial and special studies were of minimal number and character because the patient was seen during the influenza epidemic but it is safe to assume that the bone disease was not far developed if at all for the patient had been regularly employed as a waitress previous to the attack of influenza

Although afebrile when discharged in 1918 the patient had not been out of bed She could sit up but the legs were incapable of maintaining her in the upright position and after a month at home crutches were employed Later locomotion was aided by grasping solid objects Pain in the lower limbs associated with frequent headaches were the only subjective features but the legs became markedly bowed within the first 2 or 3 months at home

On the present admission March 11 1923 her temperature was 98 2 degrees pulse 100 respiration 22 blood pressure 108 50 Physical examination at this time showed a rather short small framed poorly nourished negress (Fig 1) without signs of discomfort while recumbent However because of pain upon standing the patient helped herself to maintain the upright position by grasping solid objects and walked with a wide swinging gait hardly lifting the feet from the floor Lateral compression of the thoracic wall in the act of assisting her to remain upright caused local pain of marked degree The head was roughly triangular in outline due to a slight increase in the biparietal diameter The chest was symmetrical but showed a sharp anterior angulation at the junction of the manubrium with the body of the sternum The transverse diameter was narrow producing the typical pigeon breast but no groove of Harrison was demonstrable The costochondral junctions showed symmetrical nodular enlargements The upper extremities were relatively elongated because of the shortening of the trunk and there was a definite enlargement of the hands with clubbing of the fingers The spine showed a left dorsal scoliosis of mild degree and a slight lumbar kyphosis There was an anterior bowing of the tibiæ and a less marked lateral curvature with sabre shins However the lower extremities did not appear distinctly shortened The distal ends of the femora and the proximal extremities of the tibiæ were enlarged and flattened and while the knee and ankle joints functioned poorly no essential arthritic disorder was demonstrated Œdema was absent

In the lungs a slight relative dullness was elicited below the right scapula associated with decreased breath sounds at both bases but there were no rales. The apices and infraclavicular fossæ were shrunken and there was a marked episternal pulsation and thrill

The heart presented clasical signs of mitral stenosis and insufficiency probably of rheumatic origin—and of aortic insufficiency with well marked peripheral vascular signs There were neither history nor present signs of cardiac decompensation. The other positive physical findings consisted in (a)



Fig 1 Th t d cy t m mu e eght be upo the l e tem tu s h n Tle tr ular h d a d th sh rply a ul ted ternum ar ell a th r la t el g to f th a ms a ll an l ith l bbing f the fing rs lh bo ed n l sharp tib æ with fl ttened l a t c ll Th p e h d a l ft d rsal c l f m ld d g d a l ght l mbar kyph Th ol s sugg ted s th ph tog ph



Fig The tref l tl e f the up r r tra t s cl arl sl n th th tran ntract from s ard t h nt r pres re Th b ked ymphy s d m nstrated l le the g f the p b c a ch l ev d nt upo th pl te Th bo sul t s chara terized h efly by g lize l hal t s best n n th e t l l bod es and th ppe t m ties f th fem ra A med m e cyst s p nt nea the po ter r spin of the l ft il um

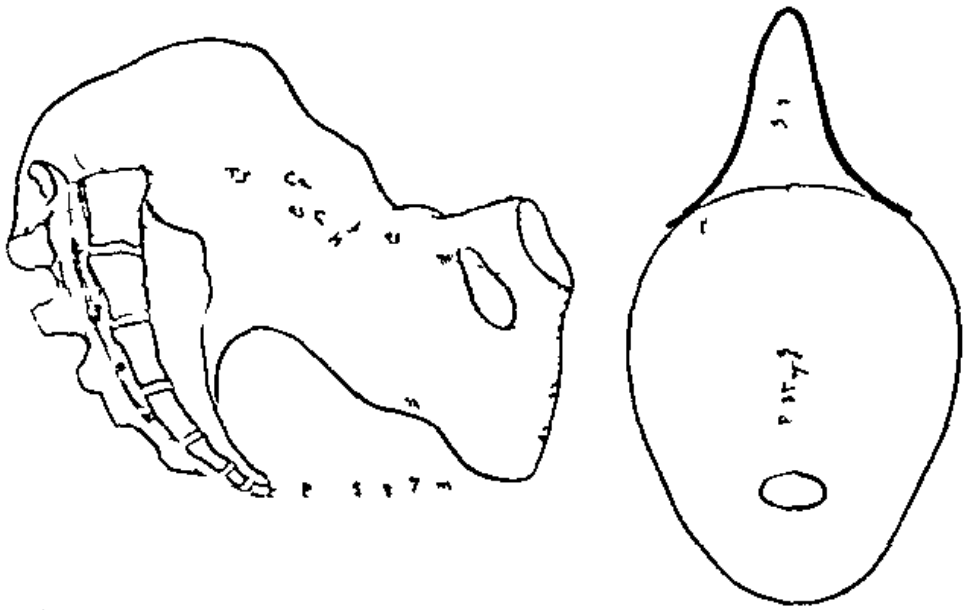


Fig 3 Th d gra j th l ft h th gn f a f th t r a l post sagitt l d m t rs th t pe th right h s th h ra ter of th pel c utlet eves t t b d l r s b ssare sect



Fig 4 Note the marked fact on ch act n tu f ll th b as ll s d fin te cy t i the th d meta c rp l find g s d to b co tant n ad a c d les ns

a slight exophthalmos with positive von Graefe and Joffroy sign s impaired convergence one pupil slightly irregular but intra-ocular reflexes nor mal (b) e larged and cryptic tonsil with pur ulent foci on the right side (c) slight pharyngeal inject on (d) small firm discrete glands in both anterior and posterior cervical triangles (e) pyor rhœa and (f) a papular eruption over the anterior thoracic wall

The abdomen was of moderate size the 9 to 10 months fetus lying in the left occipito anter r posi tion The heart sound were audible in the left lower quadrant and the head was floating definitely disproportionate to the pelvic inlet

Pelvic examination revealed no abnormalitie of the soft tissues but allowed accurate palpation of the bony inlet The superior strait proved to be of typ cal trefoil shape (Fig 2) with marked bi lateral encroachment of the iliac bones upon the superior pubic rami resulting in the beaked symphysis aid to be typical of osteomalacic ch anges The pubic arch was short and narrow the infer or pubic rami running practically parallel throughout th ir length The sac um showed l ttle change in th vertical concavity but definite decreas in the lateral concavity There was n palpable fal e p omontory The pelvic measu ements w re inter spinou 4 centimeters interc r tal 25 centimeter ntertrochanteric 26 25 centimeters Baudeloque o c ntimeters diagonal conjugate o 25 centimeters b tuberal 5 75 centimeters ante or sagittal 5 cent meters poste ior sagittal 7 centimeters antero po t n r 9 5 centimeters

The Wassermann reaction was on repeated test 4+ The urine contained a faint tr ce of albumin witho t casts Electrocardiograms demon trated (a) left ventricular preponde ance and (b) s no au icula tach card a Complete bl od counts f ll within n rmal limits—and a stained smear showed 1 o abno mal forms The white cell count of 6 240



Fig 5 Bo g f th fem s d mo t bl as w ll s a d a c d t p t cha g

(76 per cent polymo phonuclears) at the time of labor m ght be considered a relative leucopœn a

Con ideration of the mode of del very quickly re olved it elf into an elect ve cæ arean sect on ch efly on an ab olute pelvic indicat on Th s was furnished f rst by the pelvic inlet Although a diagonal conjugate of o 25 cen meters in tself would not render spontaneous d l very impos ible especially n a negr ss with a small fetus yet the availab e diameters of the superior strait were so d m nished by th coincident transv rse shorten ng that p lvic dy t cia would have be n complete Secondly the outlet contraction cl a ly indi ated th proceuure because the noteworthy shorten g of the transve se diameter was not compen ated b a cor esponding lengthening of the po terior sagittal d ameter (Fig 3) In add tion to the ind ation based on actual figur s it was grossly app rent that even should the vertex nter the s perior s rait the pub c a ch was o cont acted as to proh b t the engagement of the head to any appreciable deg ee in th anterior segment of th inf r or strait

The contraction was tentati ely att ibuted to an extreme grade of rickets—and the pe v cl sifi d as generally contract d rachit c—of pseu o teomalacic type

Consultation upon the question of cardiac reserve for general anæsthesia resulted in a favorable prognosis

The patient went into labor the night preceding the appointed date of delivery and cæsarean section was executed prior to the rupture of the membranes and within 3 hours of the time of initial contractions The operation was uncomplicated except for the difficulties attending an anterior placental attachment and the child was delivered in good condition It was thought best not to effect sterilization because of the fact that the patient was a young primipara that the child might be lost subsequently from extra-obstetrical causes and because close observation of the patient in the future was anticipated Gas-oxygen anæsthesia was well tolerated and the patient was left in good condition

The second day following operation the temperature rose to 101 5 degrees but soon fell to normal The associated pulse of 130 gradually returned to normal on the sixth day where it remained except for occasional transient periods of asymptomatic tachycardia Wound healing was excellent and only when the patient was allowed out of bed did the generalized pain and tenderness recur Excruciating pain was experienced in the lower extremities upon any attempt at locomotion and the distress was largely localized to the knees —although the skeletal elements were probably at fault rather than the joints themselves The pelvis back and thorax showed similar tenderness upon manipulation or motion This reaction justified further study of the skeletal system and the X ray plates first showed the true nature of the disease The illustrations appended (Figs 3 4 5) will indicate that the features agree in most details with the osteomalacic complex

Blood cell and plasma studies gave results within normal limits only a mild secondary anæmia being evident Calcium 12 5 milligrams per 100 cubic centimeters phosphorus less than 2 milligrams per 100 cubic centimeters carbon dioxide whole blood 44 volume per cent at 40 millimeters pressure carbon dioxide true plasma 48 8 volume per cent at 38 degrees centigrade oxygen capacity 17 5 volume per cent cell volume 3 95 volume per cent sodium chloride plasma 0 411 grams per liter

Under the administration of cod liver oil and a high caloric diet the patient's condition showed slight general improvement up to the time of discharge on the seventeenth day but the functional capacity of the limbs was still practically negligible She was allowed to return home under strict regulation of activity diet and medication The diagnoses on discharge were (a) osteomalacia (b) syphilis (c) rickets (healed) (d) rheumatic heart disease with mitral stenosis and insufficiency and aortic insufficiency (e) syphilitic aortitis (?)

The child's history was of little additional significance At birth the weight was 2 930 grams and the general physical examination showed wholly normal findings X ray examination of the wrists showed suggestive early rachitic changes Blood count red blood cells 3 912 000 hæmoglobin 75 per cent white blood cells 7 100 (polymorphonuclears 36 per cent mononuclears 59 per cent—slight acromia in stained smear) Blood Wassermann negative in the alcoholic antigen 4+ in the cholesterinized Chemical studies of the blood showed calcium 9 8 milligrams per 100 cubic centimeters phosphorus 5 7 milligrams per 100 cubic centimeters Chemical and microscopic examination of the milk yielded nothing of significance Breast feeding was used exclusively and the weight on discharge at the end of 4 weeks was 3 360 grams Repeated observations and examinations were arranged for both mother and child

In conclusion it is of interest to state that the patient in question is now 2 months advanced in her second pregnancy Repeated X ray examinations show at the present time some evidence of bony repair The general condition is satisfactory She is registered in our prenatal clinic and delivery at term will be executed by cæsarean section followed by hysterectomy and bilateral salpingo oophorectomy

SUMMARY

1 The literature of osteomalacia has been briefly reviewed In addition statistical and experimental evidence has been quoted which leads to the belief that the prophylaxis and cure of this syndrome lies largely in the problems of dietary deficiency and vitamine balance

2 The detailed history of a patient with puerperal osteomalacia is reported including X ray studies which reveal the bony changes characteristic of this disease The occurrence of the latter in a geographical locality where such lesions are rarely seen calls to mind the assertion that the disease may be more common than is generally supposed

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THE EARLY RECOGNITION OF ACUTE PERFORATION OF GASTRIC AND DUODENAL ULCER BY X-RAY EXAMINATION OF SPONTANEOUS PNEUMOPERITONEUM[1]

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FREE gas in the *peritoneal cavity* has long been recognized as a phenomenon occurring in perforations somewhere in the gastro-intestinal tract and most frequently after perforation of a gastric or duodenal ulcer. The clinical demonstration of this free peritoneal gas is usually accomplished by *percussion of the liver dullness* in that a diminution in size of the normal area of liver dullness is considered as *evidence of free air* within the abdomen. This sign is usually considered *to be of greater significance if the* zone of tympany over the liver can be made *to shift in location by changing the posture* of the patient (Ortner 10).

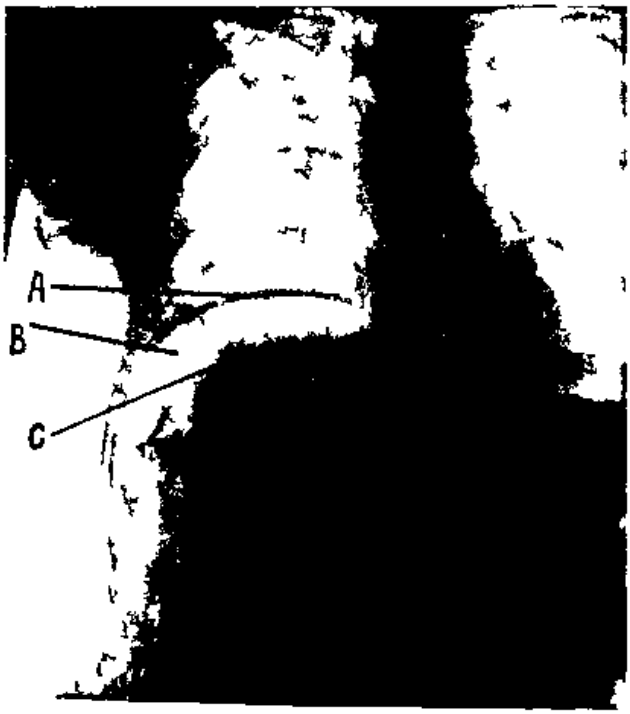
Not all cases of acutely ruptured gastric and duodenal ulcer show this sign especially in the earliest stages of acute perforation. The *incidence of the sign on percussion* varies so much with the duration of the perforation, the quantity of air which has escaped into the free peritoneal cavity and the difficulty of percussing properly a very tender and rigid abdomen that some observers attach but slight importance to the possibility of demonstrating free air in the peritoneal cavity by the ordinary means of physical examination, especially during the earlier stages of the perforation (C. I. Gibson, S. A. D. Bevan, 4, W. R. Cubbins, 6).

Our attention was attracted to the possibility of using the X ray to demonstrate free gas in the peritoneal cavity following a rupture somewhere in the gastro-intestinal tract. A few observations on the use of the roentgen ray in the recognition of free and encapsulated gas in the peritoneal cavity have been reported by several authors. K. Reinecke (12) reported a case of perforated gangrenous appendicitis which was followed by the development of a subphrenic abscess. X ray examination of the abdomen revealed a zone of air between the right half of the diaphragm and the upper surface of the liver. The zone of air was seen when the patient was in the upright position and disappeared when the patient was placed on his back. We have examined a *considerable number of patients* with acutely perforated appendices but *without the formation of subphrenic abscess* but were unable to demonstrate free gas in *the peritoneal cavity*. *Alwens (1) found* a similar picture in a subphrenic abscess following a ruptured duodenal ulcer. L. Kenez (9) observed the same phenomenon in a case of perforated tuberculous ulcer of the bowel where there were no other clinical signs of perforation such as pain, muscular rigidity, chills or marked meteorism. The X ray revealed a zone of gas between the liver and right diaphragm and was the only clinical evidence of the perforation found at autopsy. The sign was further observed by H. Popper (11) in a case of perforated ulcer of the intestine in which the diagnosis was proved by anatomical demonstration.

The observation with the X ray of free gas in the peritoneal cavity after *perforation* of a gastric or duodenal ulcer has been reported by B. Bager (3), H. Schottmuller (13), *H. A. Dahm (7)*, W. Weiland (14) and H. Wesler and L. Jaches (15). These authors reported but few cases while H. Assmann (2) who described the largest number reported a series of 4 cases very briefly in which air was seen with X ray after ruptured gastric or duodenal ulcer.

In a series of fifteen anatomically proved cases of *acute perforation* of gastric and duodenal ulcers admitted to the surgical service

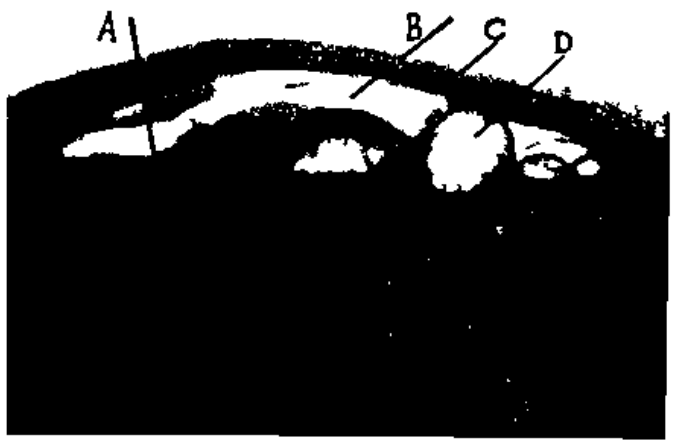
From the Department of Pathology, Bacteriology, College of Medicine, University of Illinois, and the Cook County Hospital.
[1] Read before the Chicago Surgical Society, March 7, 1914.



F X ray pl te of p t ent i the upright po tion ho ng 1 dome of right d phra m *B* f e under diaph agm *C* uppe u f ce f the l e

of the Cook County Hospital of Chicago an X ray study was made before operation to determine the presence of free gas in the peritoneal cavity The X ray examination was performed in all of these cases as soon as possible after admission and in some in stances as early as 2 to 3 hours after the per foration occurred This series of cases is of further value because the diagnosis based on the clinical and X ray evidence was checked up in all instances by immediate operation

The method employed requires no pre liminary preparation or the use of a contrast meal The patient is brought to the fluoro scopic laboratory and placed under the screen The fluoroscope furnishes all the necessary information and has the additional advantage of being rapid and at once giving the desired information without waiting for the develop in of the films Films are of value only when permanent records are desired but do not give any information which cannot be ob tained by fluoroscopy The patient may be placed in a standing or sitting position and a rapid examination is made of the entire abdomen and especially just under the dia phragm and between it and the upper sur



F g 2 X y pl t f p t t n supine pos ti n sh w g 1 le l of flu d n f e bdom nal ca ity *B* f ee ir in abdominal ca ity abo e the flu d lev l *C* nterior ab dominal w ll *D* loop of bo el c t i g

face of the liver The characteristic narrow sickle shaped zone of air to be described later in greater detail may be seen most frequently just under the right cupola of the diaphragm when the patient is in the upright position An important characteristic is the fact that *the location of the gas bubble shifts when the position of the patient is changed* The gas bubble tends to assume the uppermost re gions of the abdominal cavity hence it is found under the diaphragm when the patient is in the upright position between the right abdominal wall and the axillary surface of the liver when the patient is placed on his left side and it may be moved to the left side if the patient is turned on his right side We were able to shift the gas bubble to the pelvis in one of our cases by placing the patient in the Trendelenburg position Examination of the patient when he is again on his back shows that the gas bubble disappears from between the right diaphragm and the upper surface of the liver or other regions where the air space was seen before the patient was placed on his back The screen may be placed at the side of the patient when he is in the supine position and the gas bubble may often be seen to occupy the space between the anterior abdominal wall and the viscera

The appearance of the gas bubble within the peritoneal cavity is quite characteristic and will seldom be mistaken for other things The gas bubble as already stated assumes a narrow sickle shape is very bright and dis

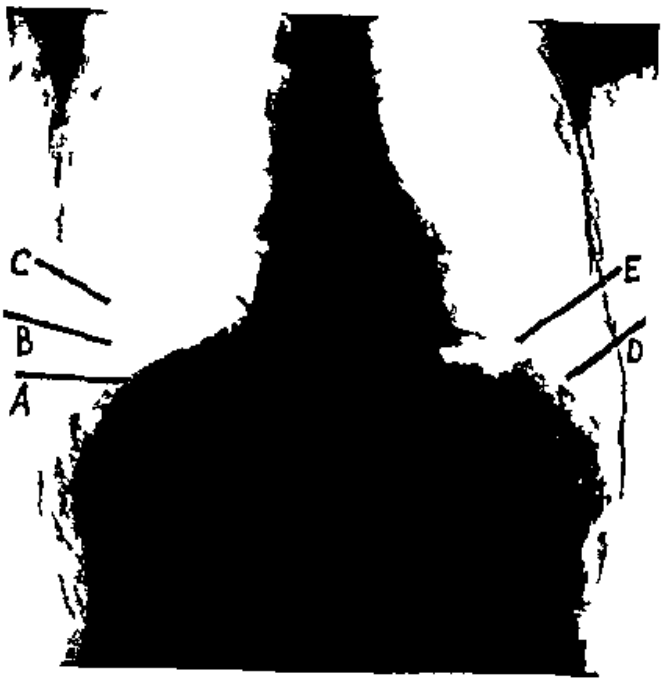


Fig. 3.—Roentgenogram of patient in upright position, showing gas shadow between liver and right abdominal wall; *A*, *B*, and *C*, lateral limits of the shadow; *D*, shadow of the right cupola of the diaphragm.

tinct with no mottling of its body and the boundaries are usually regular and constant in configuration. The most characteristic picture is seen when the air bubble is seen under the right cupola of the diaphragm. The widest part is seen to be in the middle portion while the ends approach one another until the upper margin which is more curved meets the lower boundary close to the external

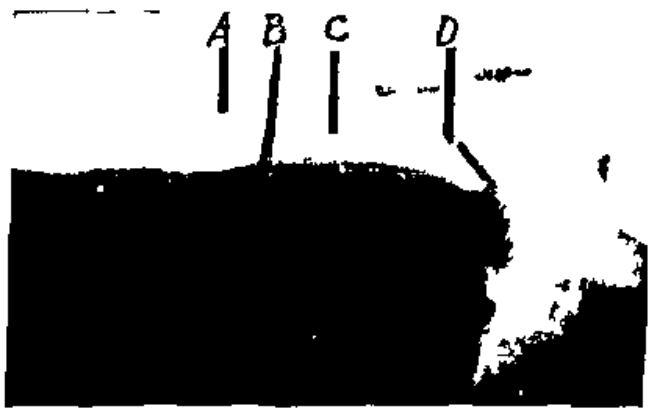


Fig. 5.—X-ray plate of patient in sitting position showing gas shadow between abdominal wall and liver; *B*, upper limit of gas shadow; *C*, lower limit of gas shadow; *D*, diaphragm.

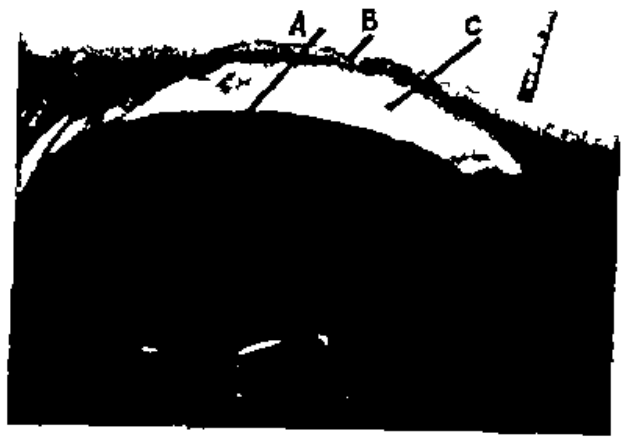


Fig. 4.—X-ray plate of patient standing, showing gas shadow between liver and abdominal wall; *A*, *B*, and *C*, lateral limits of the shadow; *D*, shadow of the right cupola of the diaphragm.

abdominal wall on one side and the midline of the body on the other. The width of the zone of air depends on the quantity of air which escapes into the free peritoneal cavity but the presence of free gas in the abdominal cavity is always very distinct regardless of the quantity. The line at the base depends on the nature of the viscera at this region or on the presence of fluid but is usually more or less of a straight line. The lower boundary is very straight and horizontal regardless of the position of the patient if the inferior boundary is formed by an accumulation of fluid and further evidence of the presence of air and fluid may be obtained by shaking the patient when it will be observed that the dependent dark boundary may be made to assume a wavy outline or may be seen to splash.

No patient is too ill for this examination as the upright position is not necessary. In fact most of our examinations were made with the patient on a cart and first on his back and then on his left side in order to demonstrate the presence of the air bubble between the right abdominal wall and the axillary surface of the liver after previously noting its absence in this region while the patient is still on his back. It is seldom necessary to turn the patient on his right side and it is only when the patient is in a comparatively good condition that he need be made to sit up on the cart or table.

The sign as just described was sought for in our series of 15 cases of anatomically proved

acute perforation of gastric or duodenal ulcer and found in thirteen instances or in 86 7 per cent We were unable to see the same phenomenon in other conditions which are usually considered as acute surgical conditions except in one instance of acute perforation of an ulcer of the small intestine The value of the sign for the surgeon is not diminished by the finding of free air in the peritoneal cavity following a perforated ulcer of the small bowel as it was a great help in the diagnosis which was a surgical emergency and required immediate operation

The following resume is a brief description of the clinical histories results of X ray examination and operative findings together with the results of operation in the 13 cases of acute perforation of gastric ulcer in which the sign previously described was found before operation

CASE 1 O B male age 56 admitted on October 22 1921 Complained for one year of burning epigastric pains 1 hour after meals and relieved by soda or food Pain was very severe in the last 2 weeks and especially on the day of admission Hæmatemesis and occasionally bloody stool in last 2 weeks The acute exacerbation occurred 7 hours before admission to the hospital Examination showed marked epigastric tenderness and rigidity and the patient as doubled up with pain The white blood count was 8 700 and the temperature normal Fluoroscopic examination revealed a zone of distinctly free air between the diaphragm and the upper surface of the liver The free air shifted in location on change of posture of the patient The patient refused immediate operation for more than a day after admission Operation then revealed a large perforated ulcer midway between the pylorus and cardia and with free fluid in the peritoneal cavity The patient died the day after the operation

CASE 2 J R male age 25 admitted to hospital November 17 1922 Sudden onset with sharp severe epigastric pain 3 days before admission Attack occurred while walking No previous digestive disturbances were noted Vomiting and prostration were present at the time of admission Marked tenderness and rigidity of upper abdomen temperature 98 degrees white blood count 10 600 urine contained a trace of albumin Liver dullness was diminished on percussion Fluoroscopic examination revealed the presence of free gas in the peritoneal cavity which shifted on change of posture of the patient Operation revealed a perforated gastric ulcer on the anterior surface 6 centimeters from the pylorus The patient recovered and was discharged as cured on December 2 1922

CASE 3 J A male age 31 admitted to hospital on October 20 1922 Complained for last 6 weeks of abdominal pain after meals with relief on taking soda Acute onset with sudden sharp epigastric pain 5 hours before admission No vomiting Diffuse tenderness and rigidity of the abdomen especially of the right side Liver dullness diminished on percussion Temperature 98 degrees white blood count 24 000 urine negative Fluoroscopy showed a bubble of free air in the peritoneal cavity which shifted on change of posture Operation revealed a pin point perforation of the stomach on the lesser curvature and about 2 centimeters from the pylorus The patient was discharged as cured on November 2 1922

CASE 4 F G male age 28 admitted to hospital on January 30 1922 Complained of epigastric oppression after meals and vomiting for last 4 weeks Relief with alkalies Sudden onset with severe pain while at work 9 hours before admission Diffuse tenderness and rigidity of abdomen temperature 99 6 degrees white blood count 17 000 urine negative Liver dullness diminished on percussion Fluoroscopic examination showed a bubble of free air within the peritoneal cavity which shifted on change of posture Operation revealed a perforated gastric ulcer Patient discharged as cured on February 19 1922

CASE 5 F S age 39 male admitted September 5 1923 Was ill for 2 weeks with dull epigastric pain 15 minutes after eating Sudden acute abdominal pain 4 hours before admission causing patient to double up Marked tenderness and rigidity especially in upper abdomen Liver dullness diminished on percussion Temperature 99 7 degrees white count 10 600 Fluoroscopy revealed a definite zone of air between the diaphragm and upper surface of the liver and shifting of the air occurred on change of posture Operation revealed a perforated gastric ulcer at the cardiac end of the stomach The patient was discharged as cured on September 24 19 3

CASE 6 R F male admitted on September 24 1923 Very ill for several days and took drastic purgatives for 2 days The symptoms suddenly became worse about 13 hours before admission with severe epigastric crampy pains and constipation Marked tenderness and rigidity of the abdomen temperature 97 degrees urine negative white blood count 12 600 Fluoroscopy revealed a zone of free peritoneal gas between the diaphragm and liver Change of position of the patient caused the gas bubble to disappear from the before mentioned location Operation revealed a small perforated gastric ulcer at the lesser curvature with free fluid in the peritoneal cavity The patient *died of* a diffuse peritonitis on October 6 1923

CASE 7 J L male age 26 admitted on February 18 1923 Ill for 2 weeks with pain in the epigastrium 1 to 2 hours after meals and at night Sudden onset 4 hours before admission with severe acute abdominal pain but with no vomiting Marked

diffuse tenderness and rigidity of the abdomen liver dullness diminished on percussion and the right side of the rectum tender on digital examination Temperature 98 degrees urine negative white blood count 21 000 Fluoroscopic examination showed a very narrow but distinct zone of air between the upper surface of the liver and the diaphragm The gas bubble disappeared on change of posture Operation revealed a perforated gastric ulcer on the lesser curvature near the pylorus Patient discharged as cured March 4 1923

CASE 8 J C age 42 admitted to hospital on January 2 1923 No previous digestive disturbances Sudden onset with severe abdominal pains 4 hours before admission and following a breakfast of pickles and tomatoes Constipation and vomiting also occurred Examination revealed marked diffuse tenderness and rigidity of the abdomen but especially near the gall bladder region *No definite diminution of the liver dullness could be elicited on physical examination* Temperature normal urine negative white blood count 14 700 Fluoroscopic examination showed a definite zone of free air in the right upper quadrant of the abdomen just under the diaphragm The zone of air shifted with change of posture of the patient. Operation revealed a perforated gastric ulcer on the lesser curvature of the stomach near the pylorus The patient was discharged as cured on January 17 1923

CASE 9 J V age 50 admitted to hospital on September 26 1923 Epigastric distress after meals for past 6 months with relief after food soda and vomiting The condition became more severe 3 months ago and was diagnosed as ulcer The present attack occurred 15 hours before admission while the patient was asleep There was very severe epigastric pain but no vomiting and the patient took a large saline purge but without effect Examination showed a uniformly distended tense tender and rigid abdomen and most marked in the epigastrium The liver dullness was diminished on percussion but the overlying zone of tympany could not be made to shift on change of posture of the patient The temperature was normal the urine contained considerable sugar but no albumin and the white count was 22 600 Fluoroscopic examination showed a zone of air between the right abdominal wall and the lateral surface of the liver with the patient lying on his left side and a shifting of this zone of air to a place just under the diaphragm and above the liver when the patient was placed in the upright position The lower margin of this zone of air could be seen to splash on shaking the patient showing that fluid as well as air was present Operation revealed a perforated gastric ulcer on the lesser curvature with diffuse peritonitis Death occurred on September 30 1923

CASE 10 H D admitted to hospital May 20 1923 Had epigastric pain 1 hour after meals for the last 15 years Relief after food soda and vomiting The pain became worse during the last 3 weeks and occurred almost immediately after meals A very severe epigastric pain occurred about 3 hours before admission and was followed by vomiting 2 hours after the onset The epigastrium was tender and the entire abdomen was rigid The liver dullness was diminished on percussion and the white blood count was 15 700 Fluoroscopic examination showed free air in the peritoneal cavity which could be made to shift on change of posture of the patient Operation revealed a ruptured gastric ulcer on the lesser curvature near the pylorus The patient was discharged as cured on June 13 1923

CASE 11 F S admitted to hospital March 23 1923 The patient had epigastric pains a half hour before meals for last 6 months with relief by food or vomiting Sudden severe epigastric pain with hæmatemesis 2 hours before admission Marked diffuse tenderness of the abdomen Liver dullness slightly diminished on percussion Dark brown material vomited during examination Temperature 97 degrees urine contained a trace of albumin white blood count 15 000 Fluoroscopic examination showed a distinct zone of air between the liver and diaphragm while in the upright position between the external abdominal wall and the lateral surface of the liver when he was on his left side and between the viscera and anterior abdominal wall when the patient was on his back A wave like contour of the inferior margin of the air bubble could be demonstrated when the patient was shaken showing the presence of air as well as fluid in the abdominal cavity Operation revealed a ruptured gastric ulcer with free fluid in the abdominal cavity The patient was in very poor condition when admitted and died on March 29 1923

CASE 12 J S admitted to hospital June 3 1923 Digestive disturbances for past 10 years. The present attack came on 7 hours before admission with sudden severe pain below the umbilicus and radiation to both thighs Constipation nausea and vomiting for 24 hours previous to the time of admission Diffuse abdominal tenderness and rigidity and especially in the lower right quadrant Liver dullness diminished on percussion Temperature 96 6 degrees urine negative white count 8 150 Fluoroscopic examination showed a definite gas bubble between the right abdominal wall and lateral surface of the liver when the patient was on his left side Further examination was considered unnecessary in view of the findings on X ray and the poor condition of the patient Operation revealed a large perforated gastric ulcer on the anterior surface and near the pylorus Death occurred shortly after the operation was completed

CASE 13 R H male age 26 admitted to hospital September 4 1922 Ill for about 1 month with crampy pain about the navel 1 hour after meals and lasting 2 to 3 hours The present attack began 4 hours ago with sudden severe crampy pains over the entire abdomen and becoming localized around the umbilicus in 2 hours Vomited three times. Examination showed an acutely ill patient temperature 102 2 degrees pulse 144 respirations 40 per

minute The entire abdomen was tense and rigid especially near the navel The right scrotum was tender hard and swollen and could not be reduced so that a strangulated inguinal hernia was suspected Rectal examination was very painful but showed nothing of importance Urine negative white blood count 12 600 Fluoroscopic examination revealed the presence of free air in the peritoneal cavity and this sign at once cleared up the diagnosis Operation revealed a perforated duodenal ulcer with free fluid in the peritoneal cavity The patient was discharged as cured on September 21 1922

A study of our series of cases shows that the presence of free air in the peritoneal cavity after an acute perforation of a gastric or duodenal ulcer was easily and distinctly demonstrated in 13 of 15 cases of anatomically proved ruptured ulcer This makes an incidence of 86 7 per cent It was also shown that the gas bubble resulting from the escape of free air into the peritoneal cavity may be seen as early as 2 hours after rupture of the ulcer The quantity of escaped air need not be very large before it can be visualized with the X ray as it all tends to collect in one place in the uppermost portion of the abdomen and becomes easily visible especially between the liver and diaphragm or between the liver and the lateral abdominal wall The air space is seen as a very bright area which is limited by very dark structures such as the liver diaphragm or abdominal wall It must be added however that air must be present in the stomach at the time of or after the acute perforation occurs in order that free air in the peritoneal cavity be found in the earlier stages The air which is normally contained in the upper part of the normal or diseased stomach and which is usually present in the stomach as a result of the act of swallowing may be sufficient to furnish enough air to be visualized by X ray after the air has escaped through the perforation into the free peritoneal cavity One of our patients in whom free air could not be demonstrated in the peritoneal cavity after acute perforation of a gastric ulcer showed an absence of the air ordinarily seen in the stomach—known as the *magenblase*

The sign is of further value because *it enables us to make a more early as well as a more positive diagnosis* The importance of an early diagnosis and immediate surgical treatment in acute perforation of a gastric or duodenal ulcer need hardly be mentioned in this paper It is a well known fact that the mortality rises rapidly with the number of hours which elapse before surgical treatment is instituted This feature is well illustrated by dividing our series of cases into two groups one in which the patients were operated upon within 12 hours after the perforation occurred and another group in which the operation was not done until 12 or more hours elapsed after the rupture In the group operated upon before 12 hours had elapsed there were 6 recoveries and 3 deaths making a mortality of 33 per cent while in the group operated upon more than 12 hours after rupture 2 recovered and 2 died making a mortality of 50 per cent

The finding of free gas in the peritoneal cavity on X ray examination may also be of value in the very early stage of ruptured peptic ulcer before a complete clinical picture has had time to develop or when the history is indefinite or of such a nature as to cloud the correct interpretation of the clinical signs A case of this kind came to our attention when a patient who had been on an alcoholic debauch for 10 days suddenly became acutely ill with a severe cramp in the abdomen and with tenderness and muscular rigidity of the abdominal wall The findings were somewhat suggestive of a perforative peritonitis but the history caused some doubt as to the possibility of the existence of a perforated peptic ulcer Fluoroscopic examination in the sitting posture at once revealed a very narrow but distinct zone of air under the diaphragm and above the liver The liver dullness was not definitely noted as diminished on percussion The findings on X ray examination led to a decision to operate at once and a perforated gastric ulcer was found The entire procedure in the X ray laboratory took less than 5 minutes and was practically without discomfort to the patient

There are a few conditions which must be differentiated from the zone of air seen on X ray examination after a perforation of a gastric or duodenal ulcer Among these are ptosis of the liver with the colon intervening between the liver and the diaphragm as

described by D Chilaiditi (5) This condi tion is seldom seen but is differentiated when present by the fact that the air space is chiefly in the lateral half of the space between the liver and the diaphragm instead of the entire length of the space and further by the fact that the air is not stationary but is changed in shape and configuration by the peristaltic movements of the colon The density of the air within the colon is not homogeneous and the haustral markings may usually be seen Intracolonic air does not move on putting the patient in a different position and a barium enema may be used in cases where there is doubt as to the location of the air Certain other gas collections in the abdomen must be differentiated from that resulting from perforated peptic ulcer These are artificial pneumoperitoneum previously induced for some diagnostic purpose and gas containing subphrenic abscess The normal gas bubble ordinarily found in the stomach and diaphragmatic hernia must be differen tiated from free intraperitoneal air on the left side Another condition which must be kept in mind especially when examining the patient from the lateral aspect and when he is in the supine position is the presence of a funnel chest which may give a false picture of air in the uppermost region of the abdomen close to the diaphragm This is caused by the d pression in the middle portion of the lower thorax apparently forming the base of an air bubble while the more prominent mammillary parts of the chest closely simulate the upper boundary of the air space This apparent resemblance can easily be detected by ex amining the patient after he is on his left side when it will be seen that the air bubble dis appears and does not shift to the region which is uppermost by this change of posture This condition may also be recognized by placing the finger or a piece of metal in the groove of the funnel chest

RÉSUMÉ

1 Free gas in the peritoneal cavity was found on X ray examination in 13 of 15 ca es or in 86 7 per cent of anatomically proved *acute perforation* of gastric or duodenal ulcer and is rarely seen in any other condition which can be confused with perforated peptic ulcer

2 The free gas has been seen *as early as 2 hours after the acute perforation occurs* and but a small quantity of air is necessary for its demonstration In some cases the gas bubble is seen with the X ray before the liver dull ness is noted as appreciably diminished on percussion

3 The presence of free air in the peritoneal cavity is demonstrated *by observing a clear distinctly bright one which shifts on change of posture of the patient* The outline of this zone of air will be determined by the location of the gas bubble and by the nature of the structures which limit it The most typical picture is seen when the patient is in the upright position The air bubble then as sumes a narrow but very distinct sickle shape and disappears on change of posture It i not necessary however to place the patient in the upright position as a sufficiently char acteristic picture may be obtained by placing the patient on his left side and observing the air bubble between the external abdomin l wall and lateral surface of the liver The entire procedure may be performed with the fluoroscopic screen and with the patient still on the cart

4 The fact that the air is free may be demonstrated by changing the posture of the patient when it will be observed that the *gas bubble seeks the uppermost portion of the abdominal cavity* This shifting of the zone of air on changing the posture of the pat ent is easily demonstrated The gas bubble is seen under the right diaphragm when the patient is in the upright position It is seen on the right side between the lateral abdominal wall and the axillary surface of the liver when the patient is lying on his left sid and may be made to shift to the left side of the patient by turning him on his right side

5 The sign is of great value because it makes possible an *early and definite diagnosis* without danger or discomfort to the patient The examination is easily and rapidly per formed and requires no preliminary prepara tion of the patient Fluoroscopy gives all the necessary information and plates are of value only when a permanent record is desired

6 The presence of free air in the peritoneal cavity on X ray examination is a very important diagnostic sign of acute perforation of a gastric or duodenal ulcer It must not be used alone in determining a diagnosis but in combination with other signs and symptoms as it is only a valuable addition to the clinical syndrome produced by acute perforation of a peptic ulcer In fact the diagnosis of perforation can usually be made on the history and physical findings and without X ray examination but it is well to keep in mind that the sign on X ray examination as previously described is almost pathognomonic of an acute perforation of the gastrointestinal tract which in the vast majority of cases is in the stomach or duodenum

7 Earlier operation is possible as a result of the earlier diagnosis which this added method of examination makes possible The earlier recognition and prompt surgical treatment will lower the mortality rate of acute perforation of gastric and duodenal ulcer

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REPORT OF A GASTRO-ENTEROSTOMY FOR RELIEF OF CHRONIC PYLORIC STENOSIS WITH SPASM DUE TO ANEURISM OF ABDOMINAL AORTA[1]

By M F BLEDSOE M D F A C S Port Arthur Texas

OCHSNER and SMITHILS (1) *in 1916* mentioned aneurism of the abdominal aorta as the first of various causes of benign pyloric stenosis After the operation in the *case reported* I *wrote to Dr Ochsner* asking him if he had operated on any cases of this kind He replied that he had not In a rather extensive though hurried search of the literature I failed to find a report of any one who had thought well of this operation for the relief of pyloric stenosis due to aneurism One of my assistants in the operation counseled that a gastro-enterostomy would not be of benefit I am very frank to confess that I am somewhat at a loss to understand just how the operation I did afford the man such complete relief

CASE REPORT

CASE S7,86 Mary Cates Hospital F C male 57 years of age *entered the hospital* January 18 1922 with the following history *He* was born in Germany has had the usual diseases of childhood denies any knowledge of venereal infection came to this country when about 20 years of age is married His wife is in excellent health He has two daughters aged 16 and 18 both very healthy no children dead His wife has had no miscarriages Patient's health has always been good until 5 years ago when he had a light attoke of paralysis affecting his left arm and leg He was in bed for a week or more but returned to work in about 5 or 6 weeks with slight embarrassment in the use of his arm and leg for several months following He has had some mental disturbances *ever since the hemiplegia He seems* perfectly normal at times but at other times knows that he is unreasonable fractious and unruly He has been away two or three times in the summer in an endeavor to boil out and improve his general nervous *debility Before his illness 5 years ago he* drank freely of beer but very little whiskey For past 5 years he has drunk very little of anything

For last 6 months he had noticed some distress in the stomach after eating a hearty meal or drinking a large amount of milk or water This gradually became worse although he began to reduce his food in amount on account of the distress Pain occurred immediately after taking food and for the last 3 months has become so intense that he has eaten hardly anything solid The pain was located in the *epigastrium and* was accompanied by a choking sensation Relief followed vomiting which occurred at times or a hypodermic injection of morphine and atropine These symptoms continued to get worse until now he cannot take nourishment even liquid without experiencing severe and lancinating pains in the epigastrium almost always accompanied by a choking sensation If relieved by morphine he sometimes vomits food which he had taken the day before For the last 3 or 4 days he has suffered almost constantly and has had a cough for the last 48 hours He has no cough at any time and so far as he knows no fever He has lost a great deal of weight estimated at 25 per cent Very careful *questioning of patient and family* reveals no evidence that patient has ever vomited blood or has had any blood in his stools He was in the hospital 3 days go January 15 for laboratory examination

Physical examination Small, *poorly nourished* man apparently 65 years old Patient looks emaciated and somewhat anæmic He appears to be suffering and is quite restless Head mouth throat and thorax are negative Diaphragm excursion apparently embarrassed and *limited though equal on* both sides The abdomen is quite rigid and retracted over entire epigastrium No point of tenderness can be determined The lower abdomen is somewhat relaxed No tympany no mass can be felt in the epigastrium although the pulsation of the abdominal aorta is transmitted to the palpating hand over a broad area and is unusually distinct Auscultation shows a bruit over the epigastrium though not clearly defined

Laboratory report. Blood hæmoglobin 65 per cent red cells 3 800 000 no leucocytosis Wassermann four plus Urine trace of albumin specific gravity 1012 occasional hyaline casts

Roentgenograms taken at 1 hour 2 hours 4 and 6 hours after barium meal all show stomach filled down to pyloric end Pylorus does not fill and 6 hour picture shows a very little has passed into the duodenal cap There is a suggestion of a mass in the *stomach extending* upward toward the diaphragm This is not clearly determined It was hard to keep this patient still and the pictures are not as clear as could be desired

Diagnosis (1) Ulcer of lesser curvature at pyloric end of stomach with chronic stenosis possibly malignant (2) Chronic pyloric stenosis with intense pylorospasm due to aneurism of abdominal aorta

Consultation with the attending physician who had the laboratory examinations made and who had treated this man for 2 or 3 weeks developed that

[1] Read before the Texas Surgical Society San Antonio Texas Oct 1922

tincture of belladonna atropine and other drugs had been used together with strict advice as to rest in bed diet etc with no improvement but on the other hand the patient was rapidly growing worse It is unfortunate in the extreme and we very much regret that we were unable to control this patient and make further flouroscopic and roentgenographic investigation in order to arrive at a more definite diagnosis but the man suffered so intensely and was so starved together with at times almost total lack of reasoning capacity that exploratory operation was decided upon as soon as patient could be gotten in a little better condition After 24 hours of preparation with constant Murphy drip of 6 per cent glucose 3 per cent bicarbonate soda operation was done Under ether anæsthesia an incision from ensiform to umbilicus just to the right of midline was made The stomach came into view easily No adhesions were present Lifting the stomach well forward a most careful examination was made and failed to show any evidence of an ulcer Pylorus was normal but with thickened wall which admitted the tip of index finger on stomach side a mass which pulsated in all directions was felt behind the stomach extending from upper border of pancreas to the diaphragm further examination showed it to be an aneurism of the abdominal aorta Its wall were thick and not easily compressible although slight pressure only was made on it It measures to the feel of the hand about 7 inches in circumference and about 2½ inches in diameter It is almost symmetrical in shape being a little larger at about its middle and is therefore an intramural cylindrical type aneurism with thickened walls Replacing the stomach shows immediately the effect of the direct pressure of the aneurism against its posterior wall The gall bladder is thin walled empties easily and no stones can be felt The appendix is free and movable with no adhesions No other pathology except the aneurism and the thickened stenotic pylorus can be determined Gastro-enterostomy was done as a possible means of relieving the pyloric stenosis and spasm Abdomen closed in the usual way without drainage Time of operation 55 minutes The postoperative course was not unusual and convalescence was uneventful There was some nausea with vomiting once or twice in the first 24 hours Barley water was given freely after 24 hours liquid nourishment freely after 48 hours Hiccough rather severe for first 48 hours subsided entirely after third day Pain on swallowing water barley water etc. for first 48 hours about as severe as before operation but was entirely relieved after 48 to 60 hours Vomiting occurred occasionally up to the fifth day after which time he began taking soft food and made an uneventful recovery He left the hospital on the twelfth day subsequent to the operation An endeavor was made of course to keep this man in bed when he returned home which was unsuccessful He returned to duty 4 weeks after the operation as timekeeper in an industrial plant which job he has continued to fill without losing any time from his work

October 3 1922 Patient's wife states that he has regained his normal weight that he eats freely of everything he wants in spite of her efforts to restrict his diet and that he has no digestive disturbances

January 26 1924 Information today is that patient continues to enjoy good health has had no medication or restriction in diet since his operation

It was my opinion at the time of operation that gastro enterostomy with a large stoma at the most dependent portion of the greater curvature of the stomach as near the pylorus as possible would give relief to the terrible pylorospasm that this man had that this in turn would check the constant and violent peristaltic waves occurring on the intake of food or water into the stomach and would therefore relieve the excruciating pain and at the same time permit the assimilation of proper nourishment We all know that once a constant and continuous spasm of the pylorus occurs from any cause it is cumulative in its action and has a tendency to produce hypertrophy that the pyloric sphincter will become stenosed by the constant activity of the circular fibers responding to the stimulus causing this spasm As a result of this there is a reverse peristaltic wave and unless the patient vomits back again goes the wave with its attendant pain to the pylorus A gastro enterostomy affording a good outlet to the stomach should soon allay the pyloric spasm and peristaltic wave and the patient should be relieved at least temporarily It is not thought that a pyloroplasty of any kind would serve quite as well as the gastro-enterostomy with a large stoma The slightly pulling downward of the stomach may have displaced the organ somewhat below the aneurism and in that way helped some although the displacing of the stomach does not occur to me as sufficient to do much if any good as the aneurism extended up to the diaphragm and really may have been transdiaphragmatic in its origin

Matas (2) has called attention to this type of aneurism—intramural spiral or cylindrical with thickened walls extending in the aorta at times almost any length even down to its bifurcation The aneurism causing this trouble was of the abdominal aorta in the main although it may have originated just above

the diaphragm The largest part of the sac or the most prominent part of the bulging was about 2 inches below the diaphragm pressing against the cardiac end of the stomach wall What damage this aneurism was doing to the solar plexus and surrounding nerves we can not say If one will review in one s mind the anatomy and physiology affected by this aneurism it may help some in arriving at an understanding of how this man gets his relief

It is admitted that an ulcer of the stomach may exist and yet at operation none be found Finney (3) says he has opened stomachs that had distinct physical signs and symptoms of the existence of an ulcer where he believed one to be present and yet he has been unable to find one I was more than careful in this instance to demonstrate an ulcer and palpated most carefully examining practically every portion of the stomach and free portion of the duodenum by folding the walls on itself etc by careful inspection and touch and by every means known to me for determining the presence of an ulcer but failed to find one

CONCLUSION

This was a case of chronic pyloric stenosis with violent pylorospasm together with cardiospasm and hiccough due to an intramural spiral or cylindrical type of aneurism of the abdominal aorta extending from possibly within the diaphragm to the upper border of the pancreas with constant and excruciating pain and starvation relieved by posterior short loop gastrojejunostomy

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UNRECOGNIZED HÆMORRHAGE WITHIN THE UPPER LEG, RESULTING FATALLY

FOUR CASES

BY CHARLES L LARKIN M D F A C S WATERBURY CONNECTICUT
Att di g Gynec l g t d As tant Att d g P h l gist St M y Hosp t l A t t A t di g Gynec l g t W t bury H p tal

THESE cases are reported to call attention to a definite traumatic condition i e hæmorrhage within the upper leg which may go unrecognized and may result fatally

This is in contradistinction to the frequent traumatic injuries to the upper leg which go on to the formation of hæmatomata of vary ing degree It differs also from hæmorrhages with resulting hæmatoma formation in the upper leg caused by penetrating projectiles as seen in the late war where wounds were explored as soon as possible with a debridement of all crushed tissue and a ligation of the bleeding vessels

Billroth[1] early pointed out that in the relatively slight injuries of the thigh hæmatomata result and that even in the severe crushing injuries of the upper leg when large vessels are severed extensive spurting hæmorrhage may not occur but a slow oozing of blood may be expected

The cases which are reported in this article indicate that the oozing may go far beyond the formation of a hæmatoma and the blood may find its way unchecked along muscle and fascial planes and result fatally The last case recorded shows that the bleeding may not occur as an ooze but as a swift outpouring of blood into the leg followed quickly by death

The first time that this condition was noted was on May 23 1915 when I assisted Medical Examiner Max Scarborough of New Haven to perform an autopsy on G O a well developed and well nourished white man of 33 years of age

During the early evening of the previous day this man had been stabbed in the groin The instrument used was the typical long bladed Italian jack knife The man was taken directly to St Raphael s Hospital His condition was not thought to be serious There was very little bleeding from the clean cut wound in the groin A dressing was applied to the wound and patient put to bed An hour or so after admission the nurse in charge reported to the interne that the patient s condition was not good The interne examined the patient who showed the usual symptoms of shock and hæmorrhage The wound was inspected and found in good condition and no external bleeding was present The dressings were reapplied The symptoms of shock increased without any apparent cause and 6 hours after the accident the patient died

The autopsy was performed 12 hours after death The body was that of a well developed and well nourished white man 33 years of age height 67½ inches and weight 160 pound The skin was very pale There was very little settling of blood in the dependent portions General rigor mortis had set in There was a stab wound of the right thigh situated 6 inches below the superior iliac spine and 5 inches from the pubis The wound measured three quarters of an inch transversally and five sixteenths of an inch vertically the latter measurement representing the gaping wound The direction of the outside wound was parallel with Poupart s ligament The wound ran almost horizontally backward and slightly inward to a depth of 2¾ inches

The lower legs were normal in size and color The right upper leg showed a uniform enlargement from the knee to the groin The skin covering the upper right leg was not tense nor did it show any change in color To external appearance except for the wound in the groin the right leg was apparently normal

When the right upper leg was opened it was found that the knife blade had passed through the skin fascia sartorius and recti femoris muscles and skipping the femoral artery and vein had severed branches of the deep profunda artery and vein Blood oozing from these severed vessels had followed the fascia planes and had infiltrated between the muscles so that the whole upper leg was filled with clots of blood and blood serum No actual measurements were made of the leg or the amount of blood in the leg Approximately the increase in the mean circumference of the upper leg was about 2½ inches to 3 inches and the amount of blood present was about 2 quarts

The rest of the examination was negative pathologically except that the skin musculature internal organs and blood vessels were found to be practically bloodless

Death was due to hæmorrhage within the upper right leg following a stab wound of the groin

[1] Allgem in hirurgisch P th l gi d Ther p 868 p 57

The second case was autopsied by me on September 3 19 0 at St Mary s Hospital Waterbury Connecticut

An Italian Wm P who while straining at his work his body musculature tens had his right foot caught between a girder and a crane and suddenly and forcibly rotated outward The foot was disengaged and the patient taken immediately to the hospital The patient complained of pain in the right ankle *and upper leg. Examination revealed* several deep lacerations over the dorsum of the right foot and fracture of the right tibia and fibula in the lower third No apparent injury of the upper leg was noted The lacerations were sutured and drained only a slight amount of bleeding having occurred The fractures were reduced and dressing applied The patient was placed in bed but did not *seem to rally as well as he should after such a* surgical procedure The pulse and respiration increased and the patient showed the usual signs of shock and hemorrhage The surgeon was notified and the dressings on the ankle were inspected There was some slight blood on the first dressings but *no active* bleeding was present The dressings were reapplied Further examination did not elicit any other source *of bleeding. The usual remedies for shock were* instituted without avail The patient gradually sank into more profound shock and died 12 hours after admission to the hospital

The body was that of a well developed muscular Italian 4 years of age dark hair and eyes Teeth were natural and sound General rigor mortis had set in

There was a ragged cut over the dorsum of the right foot The cut edges had been approximated by skin sutures and the wound drained On dissection a complete fracture of the right tibia and fibula was found in the lower third There was slight hemor*rhage around the fractures There was no difference* in size of the lower legs

The color of the upper right leg was apparently normal and the shape was not noticeably different but when compared with the left upper leg the right was appreciably and uniformly enlarged from the knee to the groin No actual measurement was made but a fair estimate would be a mean uniform *enlargement of 3 inches or more Palpation of the* right upper leg revealed lumpy masses deep in Scarpa s triangle

Dissection of the upper right leg revealed that the sartorius muscle which was unusually well developed had been ruptured in its middle third and the segments completely separated The adductor muscles had suffered a partial rupture The blood vessels supplying these muscles had been severed and the blood had oozed out and followed the fascia planes and infiltrated between the muscles Scarpa s *triangle was filled with clots* It was these clots and the severed segments of the sartorius muscle that had been palpated An estimate of the amount of blood found free in the leg would be conservatively placed at 2 quarts

The rest of the body did not show anything of note pathologically *except a paleness of the tissues and* organs and a general bloodlessness

Death was due to hemorrhage within the upper right leg following rupture of the sartorius and adductor muscles

The third case is not as typical as the preceding two for it is complicated by other pathological conditions This is a frequent type of accident and often ends in death but I believe that the secondary causes are considered the primary cause of death and the real primary cause internal hemorrhage is overlooked

J R a white man 36 years of age had been brought to St Mary s Hospital in the police patrol on the night of November 26 19 1 He had been on a drunken spree for 2 weeks and shortly before his admission to the hospital he had engaged in a brawl and had fallen *injuring his right hip* He was quite drunk on admission very nervous and complained of pain in the right hip and inability to move right *leg*

A diagnosis of fracture of the neck of the right femur was made and the leg was temporarily immobilized in a long lateral splint. During the day a general anaesthesia was administered and a long plaster spica bandage was applied to the leg At that time no swelling of the leg was noticed That evening the temperature was 98 8 degrees pulse 106 and respirations 26 *During the second day the patient* was extremely restless and irrational the temperature was 99 degrees the pulse 106 and respirations 24 During the third day the patient was so irrational that the temperature was not taken The pulse became increasingly rapid and weak The respirations were rapid and labored The patient died 75 hours after admission

The body was that of an adult white man well developed and nourished weight 190 pounds. Dark brown hair and moustache Teeth were sound Eyes were gray The pupils widely dilated *but equally so* The skin was clear but very pale There was very *little settling* of blood in the dependent portions General rigor mortis had set in On removing the cast a black and blue discoloration was noticed be*neath the skin high up in Scarpa s triangle* and compared with the left upper leg the right showed a uniform general enlargement By actual measure*ment there was 5¼ inches enlargement in circumfer*ence high up in the groin and 2½ inches enlargement in the middle third and 1½ inches enlargement in the lower third A mean general enlargement of about 2½ inches.

On removing the skin and fascia from the upper right leg large clots of blood were found filling Scarpa s triangle and infiltrated between the general

musculature There was a complete intertrochanteric fracture of the femur The segments were in apposition but the surrounding musculature was badly lacerated It was evident that the bleeding had come from this torn muscle tissue

An estimate of the amount of hæmorrhage within this leg would be one and a half quarts

There were dense dry pleuritic adhesions in both pleural cavities and definite pneumonic consolidation of both the right and left lower lobes of the lungs and congestion of the right upper and middle lobes

The other pathological conditions found were œdema of the meninges myocarditis with dilatation of the right auricle a large fatty liver toxic splenitis acute parenchymatous nephritis and acute gastritis and enteritis There was about 10 ounces of blood found in the heart but in the other organs the amount of blood found was greatly reduced

This man was suffering from acute alcoholic poisoning when he sustained the fractured femur The great loss of blood within the leg associated with the other pathological conditions were enough to cause death The pulse and respiration were typical of shock and hæmorrhage

The primary cause of death was hæmorrhage within the right upper leg following an intertrochanteric fracture of the femur The contributing causes of death were hypostatic pneumonia and acute alcoholism

The fourth case did not come to autopsy but it illustrates the fact that rapid fatal hæmorrhage may occur within the upper leg

J McE a well developed young man 20 years of age 5 feet 11 inches in height weight 155 pounds He was sitting on a girder high up in a foundry when a large iron crane approached him unawares and crushed him against a girder The man s upper left leg was caught and could not be extricated the weight coming on the left iliac bone and the upper left leg The rest of the man s body was not injured It was necessary to burn through the iron girder (1 ½ feet in thickness) before the man could be freed This took an hour and a half During this time the man was conscious and in great pain relieved by morphine but his condition was not alarming Just as soon as the weight was taken from the upper leg the man went into shock and died a few moments later when he was lowered to the ground

Examination showed that the man had bled slightly into his underclothes from a cut over the dorsum of his penis but not enough to warrant the symptoms noted.

No other external signs of bodily injury were noted except superficial abrasions of the anterior and lateral surfaces of the left upper leg The injured left upper leg was definitely larger than the right Circumference of the right above the knee was 15 inches and of the left 16 inches At the middle third the right measured 18¾ inches and the left 19½ inches in the upper third the right was 23 inches and the left 24 inches There was no change noted in the color of the left leg except in the regions of the abrasions

On palpation a fluid wave was present over and along Scarpa s triangle and in the dependent portions of the left upper leg

There was a complete but not compound fracture of the left femur in the middle third On pressure a fracture of the left iliac bone could be elicited

The general appearance of the body was that of complete exsanguination

Death was due to fracture of the left femur and iliac bones with acute hæmatoma into the soft parts of the upper leg The pressure between crane and girder had acted as a tourniquet but when released rapid and fatal hæmorrhage within the upper left leg had occurred

SUMMARY

These cases show

The possibility of losing enough blood within the upper leg to cause death Death comes either instantaneously following the rapid extravasation of blood or as in the cases of slow oozing a fatal ending may be prolonged for hours or even days One might doubt that enough blood could be lost within the leg to cause death and if that amount of blood were lost within the leg it would seem impossible to overlook it but as a matter of fact the general increase in size is very small Considering an adult s thigh to have a circumference of 23 inches high up in the groin and a circumference of 17 inches above the knee and the distance between these two points being 14 inches it is possible to compute the cubic contents of this truncated cone In the third case there was a general increase in the mean circumference to 2½ inches and by computation I find that the increase represents 1 600 cubic centimeters plus of blood and serum

The condition of hæmorrhage can be easily overlooked unless the injured leg is compared with the uninjured leg

In cases of death following fracture of the femur an unrecognized extensive hæmorrhage within the leg may actually be a factor of paramount importance in the fatal issue

In crushing injuries to the thigh with or without fracture with progressive symptoms of shock a progressive increase in the circumference of the thigh may direct attention to a serious hæmorrhage in the soft tissues of the parts

FOCAL INFECTION (ELEPHANTIASIS)[1]

By ROBERT L RHODES A B M D F A C S Augusta Georgia
From The Surgical Department of The University of Georgia

DURING the summer and fall of 1920 our ingenuity was taxed to the utmost in an effort to ascertain the cause of pain and swelling of the entire left leg of a robust appearing young man He was admitted to the University Hospital with the diagnosis of phlebitis of the left leg

His complaint was pain in and swelling of the left leg foot and thigh and headache frontal in type The onset was rather sudden during November 1917 and had persisted since The greater portion of the intervening time he had spent in various hospitals without improvement

General physical examination was negative except for left leg The thigh measured 2½ inches larger than the right and the calf 1 inch larger There was no evidence of varicosity thrombosis or phlebitis The left inguinal glands were a trifle enlarged Blood counts cultures and Wassermann were negative Spinal Wassermann was negative Repeated searches for filaria were negative Roentgenograms of leg showed no bony lesions of head showed an area of density in the upper outer portion of the left frontal sinus The urine contained a trace of albumin and a few pus cells constantly Catheterization of kidneys August 3 1920 showed a few pus and red cells from each kidney as well as a coccus infection functional output normal and pyelograms normal Both pelves were lavaged with mercurochrome 220 Following this his pain and swelling promptly disappeared He was allowed to be up to go down town and remained free from symptoms for 7 weeks when the pain and swelling returned and his urine again showed pus in spite of the fact that he had been receiving large doses of hexamethylenetetramine October 6 1920 the kidneys were again catheterized when to our surprise since it had not been present before chyluria was shown in the left kidney fat globules of variable size staining brown with Sudan III The pelves were again lavaged with mercurochrome 220 Renewed catches were made for filaria even excising several inguinal glands and examining them with negative results The pain and swelling almost but never quite completely disappeared as after the first lavage and being up had no influence upon it He was given three doses of neosalvarsan because of the possibility of filaria even though we could not find them November 11 he left to visit his wife who was ill in Providence Rhode Island Soon after arrival he developed an attack of appendicitis was removed to the hospital and operated upon We lost sight of him until a few months ago when I saw him on a visit to our city and from him learned that soon after his appendectomy he had had his left frontal sinus operated upon and that he had had no trouble with his leg since and had been able to work regularly He had then a lymphangitis with moderate elephantiasis of left leg recurring pyelitis bilateral, and left frontal sinusitis

Can we say that the probable course of development was first a frontal sinusitis with a toxic lymphangitis of his left leg and that the pyelitis developed as an additional factor? His headache and leg symptoms appeared at the same time How long the pyelitis existed we do not know but that it had its influence upon the leg was proven by relief of the latter following pelvic lavage It is not far fetched to surmise that the kidneys may have obtained their infection from the frontal sinus Speculation as to the sequence of events however I leave to you

That focal infection may produce the typical signs of inflammation in some part of the body quite remote from the focus is illustrated by the following case

One of our Medical Students 23 years of age awaked one morning with pain over the right instep The next day the foot began to swell first over the instep and then extended over the entire dorsum up to the ankle Redness and heat promptly followed limited however to an area about 3 inches in diameter over the instep The pain was quite severe during the first few days but lessened to a dull steady ache His temperature ranged from 99 2 to 102 2 degrees He had local treatment ichthyol hot compresses and hot continuous bath without improvement I saw him 5 days after onset and elicited the additional history of an acute sore throat antedating the foot trouble by several days This had persisted but was less severe He still had pain in his throat however and he had difficulty in swallowing Examination showed that both tonsils were hypertrophied and injected the right more than the left The right foot was quite swollen over the entire dorsum to the sole and from the phalangeal joints to 2 inches above the ankle The instep was quite red hot and exquisitely tender upon palpation He was sent to the University Hospital where X ray showed no evidence of bony change or arthritis He was advised to have his tonsils removed but the throat specialist felt that the infection was too acute for operation at that time His throat was treated by local applications and gargles and the foot kept in

[1] Read before The Southern Surgical Association White Sulphur Springs West Virginia December 5 1923

continuous hot bath The former improved but the latter did not Ten days after admission his tonsil were removed by Dr J M Hull Within 24 hours the pain had disappeared from his foot the redness heat and swelling promptly followed so that within 3 days there was no evidence of the former foot trouble He was discharged several days later fully recovered Surely a local infection could not have cleared up so rapidly and it must therefore have been a toxic manifestation—toxic from focus of infection elsewhere in the body

I wish to mention another type of case presenting something of a combination of the above two

A young white man muscular and well developed gave a history of recurring attacks of swelling of both lower extremities with mottled areas of redness and pain Repeated searches for cause including filaria had been made but without success In February of this year (1923) he had had a Kondoleon operation for elephantiasis of both legs He remained in the hospital about 6 weeks He came to our city in June to accept a position and soon after arrival his legs again began to swell pain and ache and irregular areas of redness heat and tenderness appeared He was put to bed and ichthyol dressing applied over both legs There followed some relief from the discomfort but the swelling and areas of heat and redness persisted August 8 1923 I saw him in consultation with Dr S Lichtenstein Both legs were swollen the left more than the right and scattered here and there over the entire leg were irregular areas several inches in diameter red hot and tender to the touch erisipeloid in type They were not progressive nor clearing up in the center as in true erisipelas but remained about the same after their first appearance General examination was negative except for mild pyorrhœa of the lower front teeth and imbedded adherent injected tonsils I referred him to Dr W E Clark for dental treatment and to Dr C I Bryans for removal of tonsils Both were promptly attended to his recovery was prompt and complete and to date he has had no evidence of return of trouble

These several cases have been selected to illustrate rather unusual manifestations of focal infection

Lymphadenitis of course always calls for a search for the source of infection and we have been in the habit of looking only or most diligently at any rate distalward for the focus In these such a search was fruitless and we were forced to look elsewhere Focal infections around the head are quite commonly associated with cervical adenitis but that they might produce a toxic lymphadenitis of a single extremity or cellulitis with all the cardinal signs of acute inflammation was rather a revelation to me

CONCLUSION

I would urge a close physical examination and the careful weighing of facts obtained before employing radical treatment in such cases of obscure local manifestation whether cellulitis or lymphangitis To have opened the foot in Case 2 would certainly have been a needless procedure to say the least and it is extremely doubtful if even any temporary benefit would have resulted had the error been made In Case 1 as in Case 3 recurrence would most probably have followed had a Kondoleon been done such an operation was quite seriously considered before the benefit from pelvic lavage had been obtained This of course afforded us the first definite clue as to the etiology and suggested focal infection to us

ADENOMYOMA OF THE RECTOVAGINAL SEPTUM ASSOCIATION WITH PREGNANCY RADIUM TREATMENT APPARENT RECURRENCE

ADENOMYOMA OF THE UTERUS RELATION TO MALIGNANCY

BY LOUIS HERTY M D NEW YORK

IN 1895 von Recklinghausen called the attention of the medical world to the subject of adenomyoma of the uterus and fallopian tubes and again in 1896 to adenomyoma and cystadenomyoma of the uterus and tubal walls

Thomas S Cullen had however had formulated his views which he still holds 2 years before von Recklinghausen's work appeared He was *the first to emphasize the origin of adenomyomata* from the mucous membrane of the uterus

Ludwig Pick acknowledged the accuracy of Cullen's findings but would not allow that his conclusions were comprehensive enough to explain *all* adenomyomata

Cuthbert Lockyer agrees with Pick as no one etiological theory can possibly be made to explain all *adenomyomata*

Adenomyoma of the uterus The female pelvic organs form the site of election of these tumors (Fig 1) but they have also been found in the bowel and stomach Von Recklinghausen divided adenomyomata into two classes (1) Those situated at the periphery of the uterus and in the tube and (2) those arising centrally The former he believed arose from a numerical increase of the wolffian tubules and the latter he considered rare *and that they were prone to undergo cancerous change* since he had seen three cases in which this malignant change had occurred

Histologically he regarded these masses as organoid tumors in which the whole structure of a glandular apparatus could be traced (Fig 5) In addition to the gland elements another typical feature was the cytogenous connective tissue which covered the canals and in which they lay embedded Around the larger cysts this tissue was scant the epithelium lying directly on the muscle Rounded elevations within some of the cystic spaces were regarded as pseudoglomeruli and to them was *attributed the function of secretion* and of allowing diapedesis of red blood corpuscles which latter were found together *with yellow and brown pigment and hyaline* bodies in the stroma surrounding the cysts

The foundation upon which von Recklinghausen's wolffian theory rests is the fact that early in fetal life the wolffian and mullerian ducts cross each other at the tubal angle at the isthmic portion of the fallopian tube or cornu uteri It is assumed that the epithelium of the two ducts comes into such close contact that a confluence of these tissues may conceivably take place This *provides opportunity for wolffian rests* being found in the interstitial part of the fallopian tube and in the cornu of the uterus The one of the features of von Recklinghausen's adenomyoma was its localization Its other characteristic was the peculiar morphology which consisted of what was thought to be an exact reproduction in a cornual leiomyoma of the component parts of the mesonephros

Chiari Martin and Schauta supported the theory of histoid changes consequent on inflammation

Schroeder Ruge Schottlander Orthmann were in the field with the mullerian theory *of origin*

Both embryonic theories mullerian and wolffian may hold good for a limited number of cases For the majority of cases of uterine adenomata however the congenital theories have had to give place to the acquired mucosal or diverticular theories of Cullen

The latter seems to have been confirmed by proving the *acquired* or mucosal nature of the diverticula thus disproving the *congenital* theory

Von Recklinghausen Die Lehre von den Geschwülsten Berlin 1896 p 548

Cullen Thomas S Cancer of the Body of the Uterus Johns Hopkins Hospital Reports Vol 4 p 1

Von Franqué carried the solution of the problem of the etiology of adenomyomata a step further than Cullen for after satisfying himself that mucosal diverticula resulted in glandular proliferation he raised the question Why does the mucosa infiltrate? This he answered by demonstrating that the epithelial infiltration was a phenomenon found in connection with partly healed salpingitis and particularly so in tuberculous cases

This view as to an inflammatory factor was utilized by Legueu and Marien who attributed the adenomyomatous condition of the uterine wall to a preceding chronic inflammation of the endometrium

The mucous membrane origin received increasing support (Lockstaedt Baldy and Longscope Robert Meyer) and so supplanted the fetal relic theory In 1900 Gottschalk Opitz and in 1901 L Kehrer worked on the same lines with similar results Lubarsch in 1902 and Robert Meyer in 1903 found that the etiology of the specific inflammation was of no importance mucosal invasion occurring in every type of inflamed tube

The cause of the infiltrative activity on the part of the epithelium is a pre existing inflammation Granulation tissue areas of round cell infiltration and proliferating connective tissue are all permeable to benign invading epithelium This is a healing process the sequence being (a) injury (b) regeneration (c) epithelial heterotopy When the invading epithelium penetrates muscular planes the result i an adenomyoma When fibrous tissue is involved the resultant is a fibro-adenoma As adenomyomata afford us the best example of benign epithelial invasion or heterotopy and as this epithelial heterotopy is essentially an inflammatory phenomenon it points to the conclusion that adenomyomata themselves are examples of an inflammatory product Nature intended the invading epithelium to aid in the repair of the damage done by inflammation In adenomyoma we seem to see this process of repair overreaching itself

Robert Meyer also partly accepted the serosal theory advanced by Iwanoff which assumes a metaplasia of the endothelial cells of the peritoneum to such a degree as to become cubical or even columnar Some think it occurs with pregnancy others describe it as a regenerative process Robert Meyer thinks that under the influence of inflammation the peritoneal epithelium proliferates and sends down buds of cells into the subjacent tissues The buds then proliferate and form branching tubular adenomatous structures These latter are lined by columnar epithelium and the crypts are indistinguishable from those derived from an invasion by true mucous membrane Furthermore the connective tissue adjacent to the adenomatous structures changes its character as the result of inflammation and becomes the cytogenous tissue which is one of the predominating features of adenomyomatous growths and this cytogenous tissue even in serosal adenomyomata takes on decidual reaction in response to the influence of pregnancy

During a recent interview of the writer with Robert Meyer on this subject he stated that the wolffian body could not possibly be a source for the development of adenomyomata since the morphological picture of the latter has no resemblance whatever to this embryonal organ or any of its developmental products Neither does this organ at any time come into contact with locations where adenomyoma is found in adult life He does believe that all adenomyomata arise in an inflammatory basis and are either inclusions or proliferations into the depth from either uterine mucous membrane or from peritoneal serosa Only an origin from peritoneal serosa will explain the presence of adenomyomata in the pouch of Douglas He believes that the adenomyomata are not malignant for they do not recur nor do they metastasize

Cullen describes the cases he has observed as consisting of uterine mucosa within myomatous tissue These cases always originate from mucosa lining the uterine cavity To establish the mucosal origin it is not necessary that uterine glands be traced by continuity For this gland tissue is surrounded by a stroma identical with that surrounding the uterine glands in their normal location and in some cases miniature uterine cavities are scattered throughout the myoma (Fig 11) Furthermore this gland tissue retains its

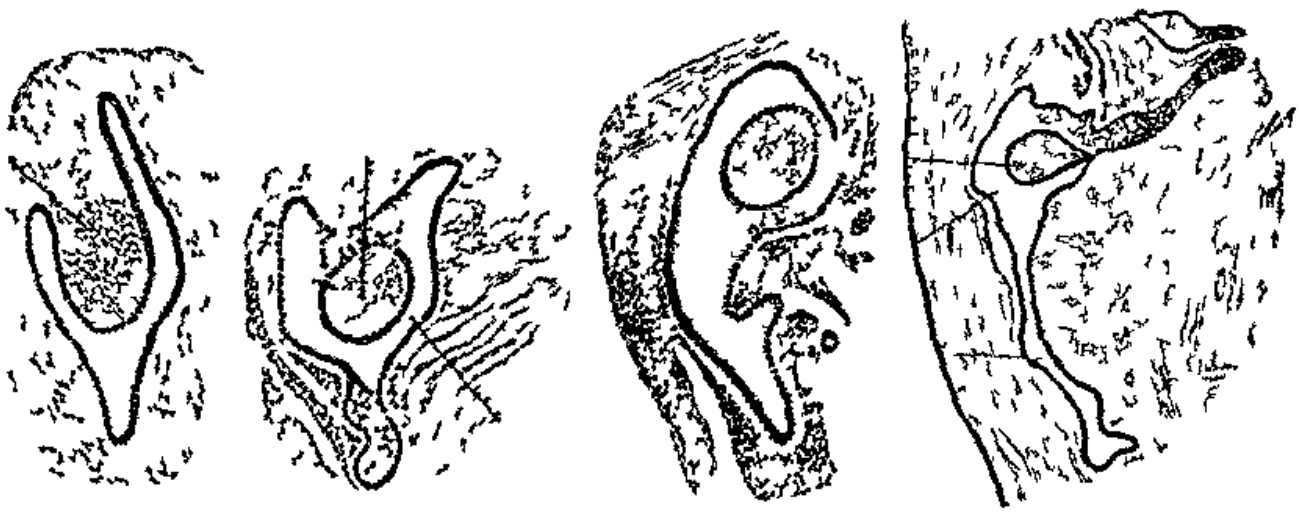


Fig. 5.—Genesis of pseudoglomerular formations from the papillary epithelial mesomatous modular drawn by Ludwig Pick to demonstrate the regard morphology of these growths. (From Pick: Arch. f. Gynek., 1897, li, 17.)

cervix. In other cases the nodule seems firmly fixed to the rectum.

On rectal examination these tumors, if situated directly behind the cervix, can often be more clearly felt than through the vagina. If the growth be adherent to the rectum, the



Fig. 4.—Adenomyoma of the rectovaginal septum. High power view of one of the cystic spaces, illustrating an early stage in the formation of the pseudoglomerulus. (See Figures 5, b, c, and d.)

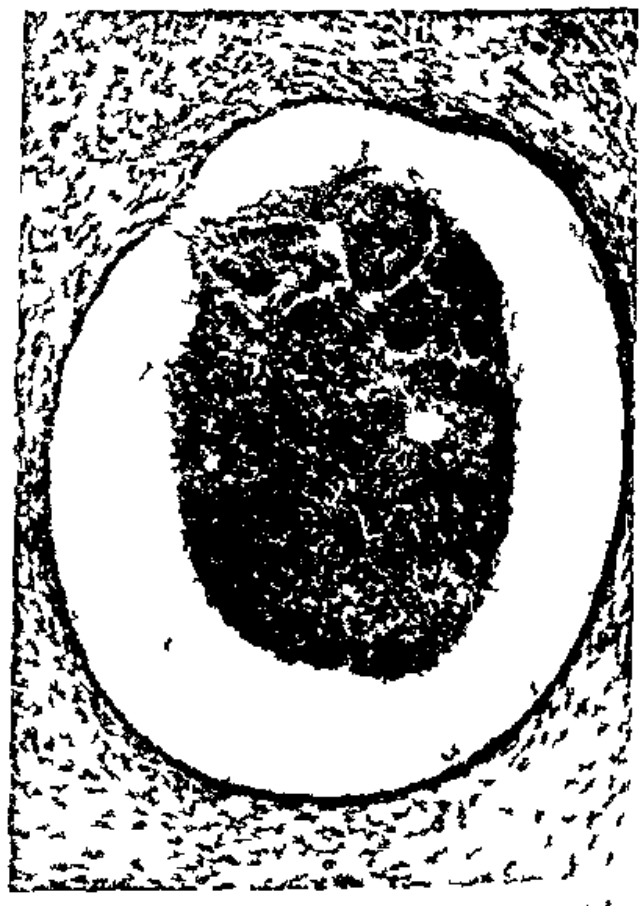


Fig. 6.—Adenomyoma of the rectovaginal septum. High power view of cystic space with pseudoglomerulus (Fig.) illustrating early stage of the process of the pseudoglomerulus.



Fig 7 Adenomyoma of uterus associated with malignancy Uterine polyp hyperplastic tissue removed with curette



Fig 9 Adenomyoma of uterus associated with malignancy Cancer nodules hyperplastic tissue removed with curette

bowel over this area is hard and does not yield The rectal mucosa however even over the growth is as a rule perfectly normal although the tumor mass projects slightly into the lumen of the bowel

Diagnosis Adherent adenomyoma of the rectovaginal space has been mistaken for hæmatocele for pelvic abscess for cancer of the rectum and for adherent adnexa in the pouch of Douglas Sometimes the mass ulcerates through the vaginal mucous membrane bleeding on touch and causing a red or brownish vaginal discharge

Prognosis Freund considers the prognosis in adenomyoma poorer than in myoma Curetting and medical treatment make it worse

Fritz Volk points out the danger in curetting for it may lead to hæmorrhage which may and did in a case reported lead to a fatal result

Lockyer summarizes the outlook by regarding an adenomyoma as a hæmorrhagic and painful structure which is found associated with inflamed adnexa pelvic peritonitis parametritis infiltrations into the bowel caseating tubercle carcinoma and sarcoma

Treatment For extensive growth of the rectovaginal space partial or total resection of



Fig 8 Adenomyoma of uterus associated with malignancy Adenomatous nodules hyperplastic tissue removed with curette



Fig 10 Adenomyomatous ulcerated through vaginal wall (Fig 9) showing irregularly glandular structure Gynecological Laboratory Rockefeller Institute

the bowel is not necessary When the diagnosis has been established histologically showing it not to be a carcinoma but an innocent epithelial infiltration many advocate a complete hysterectomy removing as much of the growth at the same time as possible without resecting any part of the rectum

Lockyer states that all forms of radiotherapy are generally disappointing He says that they may be expected to excite the inflammatory process which is the pathological basis of the disease Griffith reported a shrinkage of the mass by the use of the X rays

A case here reported which besides demonstrating the effect of radium also illustrates the effect produced by an associated pregnancy

This refers to a young woman 30 years of age who 6 years before had been delivered of a child with high forceps made necessary by a contracted pelvis A considerable laceration resulted which was immediately repaired The recovery was uncomplicated except for a small breast abscess One year later she aborted at the tenth week of pregnancy

The patient had never had a serious illness suffered any accident nor been subjected to any operation

Her family history but for a strain of nervous and mental disease was of no consequence

The present illness was first noted 2 years ago (in 1910) when the patient had pain during coitus for a few months and on one occasion noticed bright red blood flowing from the vagina following an intercourse This was soon followed by a brownish vaginal discharge with a bright blood admixture observed between menstrual period Though the amount was slight it was observed daily A gynecologic surgeon then consulted spoke of feeling a nodule in the posterior vaginal wall but advised the patient it was of no importance and treated the bleeding with tamponage As a result of this treatment the bleeding became less but the brownish discharge continued

Soon the patient felt pain on exertion (lifting the baby ironing etc) and especially on defecation This latter pain she described as being very severe Medical consultation attributed this symptom to hæmorrhoids However the pain now became continuous the patient being unable to find any position sitting or lying down in which she was comfortable being most uncomfortable when walking (At that period patient was compelled to have her husband committed to an asylum with a diagnosis of paresis and a positive 4+ Wassermann) She cannot state for information as to whether her vaginal condition was in any way related to her husband's syphilis Two Wassermann examinations at an interval of 3 months both proved negative

On *examination* a small nodule was felt in the posterior vaginal wall behind and to the right of the cervix This little mass was about 1 centimeter in diameter presented an irregular surface to the examining finger was very tender and bled easily Rectal examination was even more painful and disclosed that the rectal musoca was not involved being freely movable over the small mass

When *examined through a vaginal speculum* the nodule was disclosed to consist of a series of papillomatous excrescences perforating the vaginal mucosa and appearing above its surface to about one-half a centimeter Their color was a blood red and they bled when touched with a cotton wrapped probe

All pelvic organs were in their normal position not enlarged tender or presenting any pathological sig

During my absence from the city another surgeon at the Long Island Hospital of New York made an attempt to remove this mass He found that since my last examination a smaller mass had broken through the vaginal mucosa presenting similar characteristics to the one first seen and appearing in the posterior anterior wall to the left of



Fig \d my ma f teru associat d th mal gna cy Ade myomatou nod le f nd cervix f ll the byst ectomy f r rci oma \ t th I rge gla dula tructu lmo t a p od t f t t ty describ d by C llen

the cervix Apparently these nodules were separate and distinct from each other being separated by about centimeters of normal vaginal wall

He also reported to me that he had made an attempt at removing these mas es employing general anæsthesia He exci ed from th right si le a str p 2 5 centimeters long 1 centimet r wide and 1 cen t meter deep This strip bore the nodule of the right side He also remov d a strip 1 5 centimete s long and o 75 centimeter wide an l deep bearing the no lule of the left side H veve he found that he had not succeeded in removing the entire mass be cause of its attachment to the rectum nor could he control the bleeding by ligatures or sutures The pati nt s vagina was tightly packed with gauz The bleeding continued for o days in the ho pital gradually diminishing during the following weeks at h me But the pain was constantly becoming wo se During the next m ths the bleed g finally ceased but the pain was very vere

The *h stol g c l exa n at* r of the tissu remov d d closed cystic spaces l ned with cylindric l epithe l um (Figs 2 and 3) They we e urrounded by the l *mpho* d tissue described by Cullen an l oth r being characteristic uterin tr ma Th s typ al uterine glands were embe l led in on striped mu cle and fibrous tissue I l an l of this c llula strom w thout the presenc of glan l w re seen (Fig) The gland spaces contain d ed blood corpu cl in various stages of degen rati n R unded l v t ns within some of the cystic sp ces (Figs 3 4) rega le l as p eudoglom uli ere also b e ved

The explanation for the formation of these as given by Lud ig I ick[1] impresses the writer as a reasonable one (Figs 5a b c d) though Pick attempted to explain a w lffian tubule origin to which the pre ent writer does not subscribe The genesi of the pseudo glomeruli is well illustrated by one of the specimens (Figs 2 and 6)

Having failed to remove the growth completely by mean of surgery our next recourse was to a phys ical agent and we s lected rad um as the means In January 1920 the patient was treated with a urface application of radium the latter being held in po ition with dental modelling compound The treatment was under the direct supervision of Dr Harold C Bailey and carried out by him at the Mem rial Hosp tal New York

Thi tre tment ga e the patient no further relief and objectively the no lules remained unaffected

In April 1920 Dr Bailey buried some bare tubes of radium emanation into the nodules Following thi the pain was d min hed in intensity but not gon The nodules could no longer be felt r month lat r

In the f ll of the ame ye r the nodules recurred n the old locati ns Bleeding and pain was asso ci t d ith this recurrence

The patient then b came p egnant (The first h ban l h d meanwhile d e l of his paresi and the patient had married a healthy man) Evidently small rests remaining after the bare tube treatment had welled as a result of the pregnancy an l be n

[1] Pick L d g Arch f Gynec 897 l 1 7

the cause of the recurrence Unfortunately were not able to obtain a specimen for microscopic examination during the pregnancy Fearing the further effect of the pregnancy and especially of the labor on these nodules the writer interrupted the pregnancy at the third month

More bare tubes were buried into the growth and they as well as the symptoms promptly disappeared

Another pregnancy soon followed and the patient was very anxious for issue from the new union (Evidently the radium treatments had not deleteriously affected the ovaries) Again the pregnancy exhibited the characteristic subjective and objective effects in the regions of the original growth The writer also taking into consideration the pelvic contraction necessitating a high forceps operation in the previous labor decided to allow the pregnancy to go to term and then deliver the patient by a cæsarean section This was successfully accomplished Following the cæsarean operation and to the present date now 3 years the patient has not had any symptoms from the adenomyoma nor have any palpable nodules appeared To the eye the previous localizations are now only apparent by a telangiectasis similar to that which appears in the skin following heavy doses of X ray

It is interesting to note that other observers had reported that during pregnancy in many cases the cellular stroma around the gland tissue of the adenomyoma takes on decidual changes

Cullen reports a case in which there was an unruptured tubal pregnancy on the right side There was a myoma in the fundus and an adenomyoma of the left uterine horn The stroma of the latter had undergone a decidual reaction although the adenomyoma was at least 9 centimeters away from the tubal pregnancy W S A Griffith showed microscopic sections of portions of tissue from an adenomyoma of the rectovaginal septum in a woman who was near full term The cellular stroma was seen to have undergone marked decidual changes

This case suggested to the writer the possibility of another etiological factor beside the inflammatory one namely the mechanical implantation of uterine gland into the vaginal laceration during the high forceps operation performed some year before the appearance of the adenomyomata The laceration having been immediately repaired these glandular structure were practically included such as are known to occur in wound of the skin and which also result in cystic growth

Any information relative to similar experiences would be appreciated

Association with malignancy The adenomyomata of the rectovaginal septum represents a type of neoplasm that is essentially benign yet infiltrates into the muscular layer Adenomyoma may however become malignant though probably very rarely

In Lockyer's opinion an adenomyomatous change may form a benign intermediate stage in the transition from an inflammatory to a malignant process This is made probable by the observation of tubules lined with a single layer of cubical epithelium lying in the midst of cancerous areas in cases of adenocarcinoma of the fallopian tube

Von Recklinghausen in one of his first monograph (1896) on this subject put on record three malignant cases associated with adenomyoma of the uterus

Sitzenfrey Rolly Schuetze Max Schwab H Dilman and Gruenbaum have reported the occurrence of malignancy in association with adenomyoma

Cullen has published six cases of epithelioma of the cervix associated with diffuse adenomyoma of the body of the uterus and two cases of diffuse adenomyoma occurring with adenocarcinoma of the body of the uterus

Sarcoma associated with adenomyoma has been reported in two cases those of Iwanoff and Bauereisen

To these cases of malignancy associated with adenomyoma of the uterus the writer wishes to add another

This relates to a woman 48 years of age who sought medical advice for pain in the sacral region She had never during her sexual life had any pelvic trouble Twenty years before she had been delivered of twins her only pregnancy At the time of cessation she had no bleeding having been in menopause for several years Careful questioning brought out no further symptoms or signs beyond complaint being backache

On examination she was found to be a well nourished woman with health vital organs

Vaginally no could be protruding from the external os of the cervix three or four small rounded bright red nodules each about 2 or 3 millimeters in diameter They were not tender to touch nor did

Rec l h h h ca of [illegible] ma of the
ec inal sep m il f rr operation h res l tevere
ca h pe e m ti nal l

they bleed easily during the manipulations They seemed to be sessile and were taken off with a sharp curette Further pelvic examination proved negative The microscopic examination of these nodule revealed the following One nodule was a conventional uterine polyp (Fig 7) One showed the characteristic structure of adenomyoma dilated uterine gland surrounded by cytogenous tissue and embedded in a fibromuscular stroma (Fig 8) One however revealed an entirely different morphology namely a typical medullary carcinoma (Fig 9) with an irregular gland structure in one corner (Fig 10)

These specimens were examined by James Ewing Francis C Wood and William H Woglom who all agreed on their malignant nature

Is this an abortive attempt of the cancer cells to build up glandular structures or are these glands similar to those seen in the section of the adenomyomata (Fig 10) showing a transitional stage in the malignant process? On this microscopic evidence the writer performed a radical hysterectomy (extended Wertheim)

The specimen removed revealed a small uterus with two small intramuscular fibromyomata (about 2 centimeters in diameter) near the cervical junction and to our surprise no further evidence of any malignant disease On examination of a serial section further areas of adenomyoma were found in the cervix (Fig 11)

The writer wishes to place this case on record as an intimate association of adenomyoma with microscopically malignant changes and also as one of the cases where the curette apparently removed the entire malignant process

The patient 3 years after the operation is in perfect health and a recent examination reveals nothing of a pathological nature

EPIDERMAL CANALS INFECTED WITH GONOCOCCI

A Description of Three Cases

By ERNEST RUPEL M D Indianapolis Indiana

ABNORMALITIES of embryologic origin in the raphe of the penis are not common and there is scarce mention of the subject in the American literature Kocher (6) back in 1887 described cysts of the raphe of the penis and scrotum and of the earlier writers Thoele (10) in a review of the literature made an outstanding contribution Rather recently Gutmann (4) reported his study of three instances of cysts and one subcutaneous tract Milian (8) with others (1) has reported the finding of epidermal canal in the raphe The canal described by Milian extended the full length of the penis but those described by the others were shorter

A description of three cases of epidermal canaliculi infected with the gonococcus may be instructive

Case 1 Age 23 First gonorrhœal infection 3 years previous and had had many recurrences He gave a history of having suffered a contusion of the penis while riding a horse 3 years before since which time there had persisted a small opening just back of the frenum Though no trouble had been experienced from the opening it had always discharged a watery secretion

The foreskin was short From a small orifice 1 centimeter back of the frenum a cord like subcutaneous thickening passed anteroposteriorly and terminated in a blind sac 3 centimeters from the frenum No connection with the urethra could be made out no pus found

The next day pus with intracellular diplococci exuded from the tract

After 3 days the patient disappeared With a severe urethritis he returned at the end of 11 months and at this time the tract was open at both ends and discharged gonococci Silver nitrate solution passed freely through the channel

Again he disappeared for a year at the end of which time the urethritis had subsided but the canal still discharged gonorrhœal pus

The tract was excised and the wound healed promptly

Case 2 Age 23 For 2 years multiple fistulæ (Fig 1) in the raphé had been discharging gonorrhœal pus These fistulæ were the persistent remains of pustular eruption which formed in the raphé immediately following a penile urethral abscess a complication of his only attack of gonorrhœa The infected follicle had been located mid shaft and the pustules seemed to spread gradually both anteriorly and posteriorly The inflammation incident to the formation of one of the recent openings had caused him to seek medical aid and various antiseptics had been injected into the openings but the infection persisted

A fibrous cord could be felt in the raphé extending from a point 1 centimeter back of the tip of the retracted foreskin to a point on the posterior surface of the scrotum a little below the middle There was no connection of the cord with the urethra but the multiple fistulæ were intimately associated with the tract for solution injected into any one of the openings could flow from out the others The one farthest back had a considerable area of inflammation around it and in regard for this mixed vaccine was given for 5 days before excising the tract Excision resulted in prompt healing and no subsequent trouble He had an active or inactive *urethritis* at the time of operation



Fig (left) Sketch of specimen and method of slitting the raphé with dotted lines showing the sites of the fistulæ with the suppurating sinuses excised

Fig Sketch of the penis about two-eighths natural size

Case 3 (July 1923) Age 27 This patient had been cured—so far as could be determined—of gonorrhœa 3 years before His record shows that examination of the external genitalia disclosed nothing abnormal at this time He had never

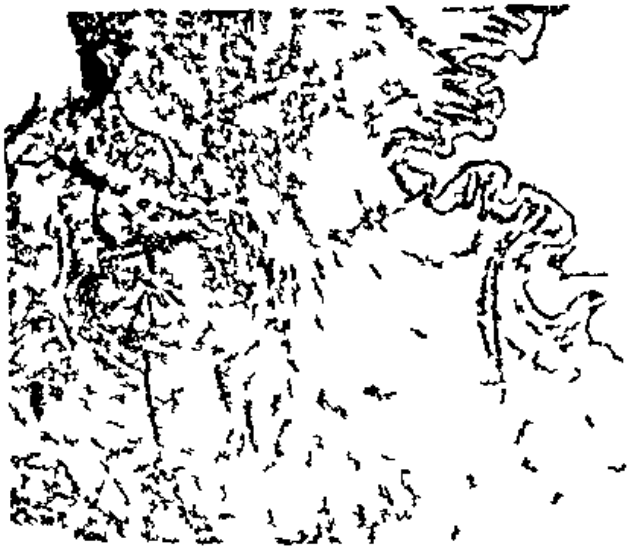


Fig 3 Low power photomicrograph of the tissue in the wall



Fig 4 Low power photomicrograph of fistulous tract through one of the fistulæ

ences of the urethritis Several sores on the ventral surface of the penis had caused him to return to my office These lesions had all appeared in the space of the last 4 hours They were very tender to touch had an area of inflammation about each one ere all in the raphé and ere scattered from within 2 centimeters of the coronal sulcus to the perineoscrotal junction They were seven in number A subcutaneous tract led from the front to the back and here again solutions passed freely through the canal and *fistulæ*

The condition has improved spontaneously and with only two or three fistulæ showing activity he did lays operative interference

The most interesting feature is that his trouble came on absolutely independently of any urethral infection

Unfortunately the specimen resected first was misplaced From the second specimen (Fig) fifty serial sections were studied The pathological report follows

Pathological Report by E V Hahn (Lab No 59) The specimen consists of a narrow strip of tissue 18 centimeters long which can be divided into three portions The middle 5 centimeters is narrower than the rest and has no integument One distal portion (penile) is covered on one side by delicate wrinkled skin The skin surface bears three small nodular elevations in the centers of which there are crateriform depressions The other distal portion 8 centimeters long also bears skin which is of coarse texture Two nodules similar to the other described appear in the midline of this portion Between the nodules there is a subcutaneous cord like elevation Throughout the entire specimen there is a dense fibrous column of tissue in which no lumen can be demonstrated grossly This column of tissue is quite adherent to the skin and causes the subcutaneous cord like elevation at one end of the specimen The section shows a thin line of follicular skin adjacent to which is a complete tubular structure seen in cross section This tube is lined with irregular stratified squamous epithelium The tube is completely surrounded by subcutaneous tissue containing strands of smooth muscle In the vicinity of the tube the elements of the fibromuscular tissue show circular arrangement The stratified epithelium of the tube varies greatly in thickness in the different sections studied Its contour is very irregular especially on the tissue side where it sends long processes into the connective tissue In some sections small gland like tubules lined with cuboidal epithelium are found lying near the tube Serial sections show that the epithelium lining the tube is continuous with the squamous epithelium of the skin of the penis through the fistulous openings in the nodule mentioned in the gross description In all sections the tissue around the tube is densely infiltrated with lymphocytes and polymorphonuclear



Fig 5 High power photomicrograph showing stratified epithelial lining of fistula and infiltration in subepithelial tissue

leucocytes Many polymorphonuclears are found in the epithelium and free in the lumen of the tube

The openings of the third canaliculus show little inflammation now and the base or floor of the shallow depressions appears to be covered with normal skin tissue The channel may be probed for a considerable distance in either direction Beyond a doubt the epithelium lining the tract is of the ordinary squamous type

The question arises as to how these tracts originated The possibility of a lymph channel infection with subsequent ingrowing of skin was considered in the second case which had a history of progressive extension both posteriorly and anteriorly Study of the microscopic sections (Figs 3 and 4) however does not support this supposition That these canaliculi are broken off mucosal remain of the urethra is very improbable for the epithelium is not similar One such accessory channel which was definitely the outgrowth or outbudding of the urethral canal has been described by Johnson (5) in a study of the male embryo It is improbable that the tubes are para urethral ducts for the latter have their origin in the urethra (2) Existence of these epidermal tracts has not been found in the embryo though the studies of the development of the urogenital organs has been very extensive as is indicated by the works of Pohlman (9) and Felix (3) Actual determination of the origin therefore is well nigh impossible

The following quotation from Lewis (7) throws light on the subject The urogenital sinus acquires a cleft like opening along the under surface of the penis The elongated aperture closes from behind forward along the line permanently marked by a raphe Very slight deviation from the normal process of closure could produce the malformations illustrated by these three cases The tracts are most likely of embryologic origin

Approximation of skin surfaces though free from infection does not cause fusion and irrigation of the fistulous tracts does not obliterate them They require then excision to effect a cure Excision is simple and occasions little discomfort to the patient

CONCLUSIONS

1 Epidermal canaliculi of the raphé of the penis are relatively uncommon though commoner than the literature suggests

2 Infection of the tracts is responsible for their discovery

3 They are capable of harboring gonorrhœal infection many months—even years—and show little or no tendency toward spontaneous healing

4 Radical excision is the method of choice in their removal

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DEPARTMENT OF TECHNIQUE

EXCISION OF CERVIX FOR ENDOCERVICITIS

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IT is a well known fact that chronic endocervicitis is an infectious process involving the glands in the cervical mucous membrane hence any form of treatment other than excision of the e glands is only palliative

The mucosa of the cervix when it is the seat of chronic infection becomes swollen and everted while the mucosa of the portio about the external os presents a circumscribed area of glandular proliferation The columnar epithelium covering the mucosa of the cervical canal under the constant stimulation of infection rapidly proliferates and pushes itself out on the vaginal aspect of the cervical rim replacing the stratified epithelium which is normally present in this situation producing the so called erosion The continued congestion incident to such a condition produces a hypersecretion from the gland structure and a hypertrophy and hyperplasia of the cervical connective tissue Sooner or later owing to the tissue hyperplasia the crypts of the cervical glands become occluded and the secretion is retained thus forming retention cysts the so-called nabothian cysts so commonly found in the region of the cervix Section of a distended nabothian follicle shows a large clear space which is lined with columnar epithelium and filled with mucus Serial sections made from the excised cones of

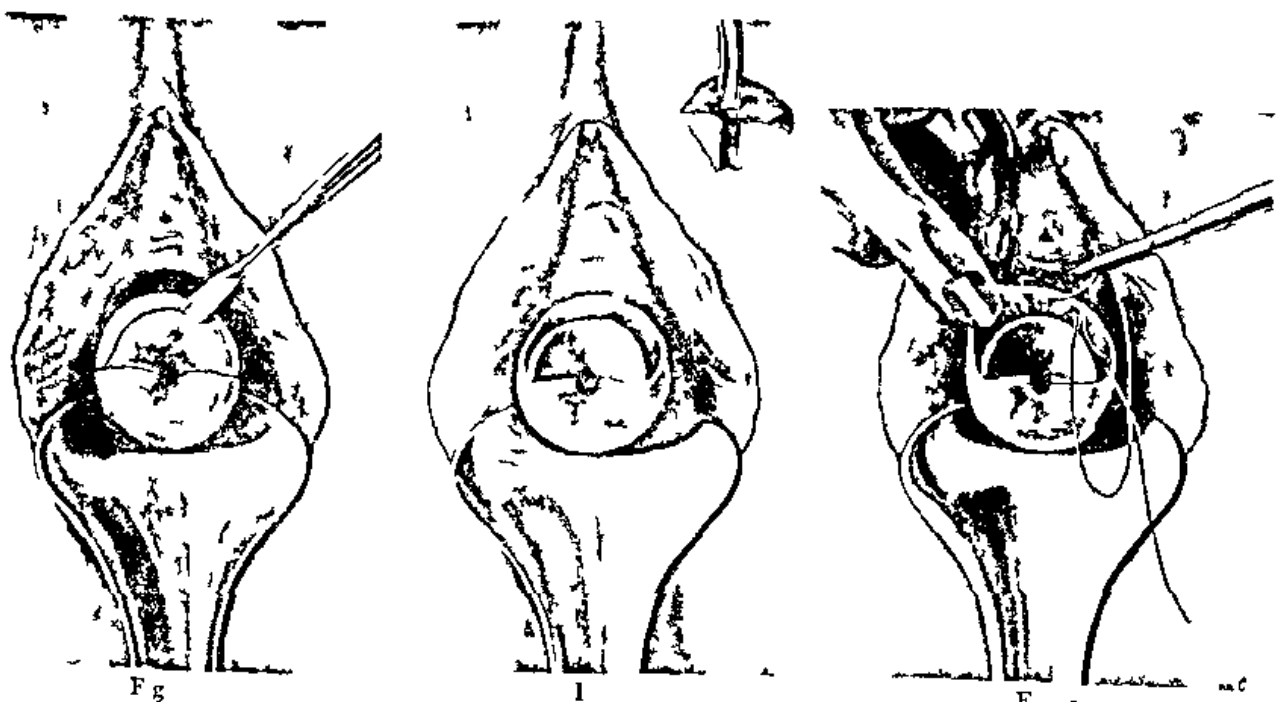


Fig 1 — Ablation of the cervix through the portio showing the incision through the mucous membrane

Fig 2 — The operation nearly completed

Fig 3 — A submucous shelf portion of the cervix and body of the uterus

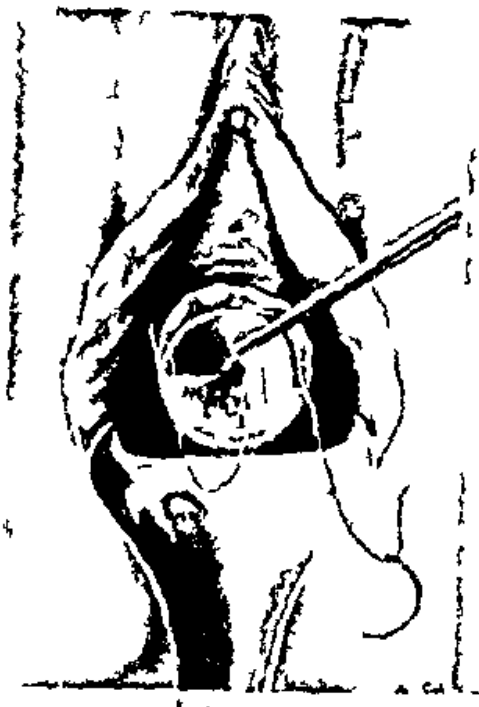


Fig 4

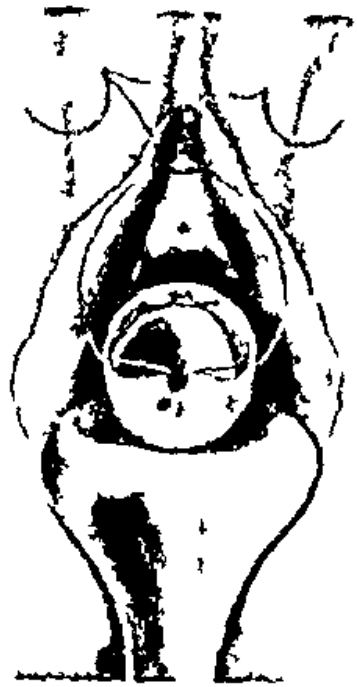
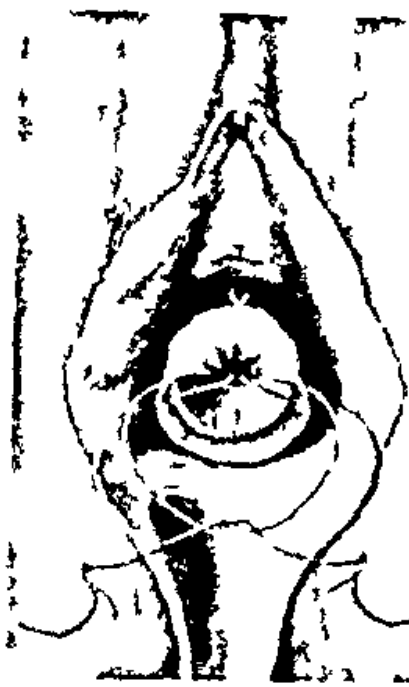


Fig 5



Fig 6



Fig

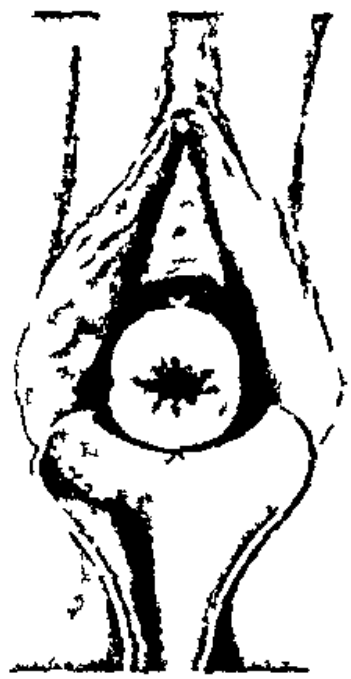


Fig 8

Fig 4 Whe th opera a is tea hed the per r nal and ver t ough the

Fig 5 The r by h g it through t e opera a le

Fig 6 Th t is made t the apical mu s pare w te al with her cone ward

Fig 7 The sam t i l cervix th her i

Fig Th sut re made and the ge t ure cu t

ervical t ue similar t those shown in Figure how erosion chron inflammation cystic hanges etc in varying intensity Beginning at the distal end we find marked inflammatory hanges but as we approach the proximal extremity these near the internal os these changes are either barely perceptible or are entirely absent showing the effect of the surgical procedure to be described under treatment below in so far as the removal of the infected area is concerned

Serial section at layer A (see diagram) near the cervix how marked chronic inflammatory cystic changes less so at layer B and at normal cervical tissue at layer C which is practically the internal os

Similar findings were present when clinical attempts at the early detection of chronic cervicitis were made by the use of the infected area With the aid of this method of great importance we have

offer this criticism In the Sturmdorf operation the cervical canal is excised as one cone and the work is done blindly as one is unable to tell how far up the cervical canal the infection extends and either too little or too much of the canal is excised and too much of the cervical musculature is sacrificed in excision of the cone If too much cervical tissue is removed the operation becomes a high amputation which for obvious reasons should be avoided Following the Sturmdorf operation we have had cases of dystocia requiring cæsarean section This was due to the fact that *too much cervical musculature had been removed* with the excised cone If on the other hand not enough tissue is removed infected glands are left behind and the purpose of the whole operation is defeated For these reasons we have modified the operation and believe we have gained a distinct advantage We have used the modified operation a number of times with excellent results

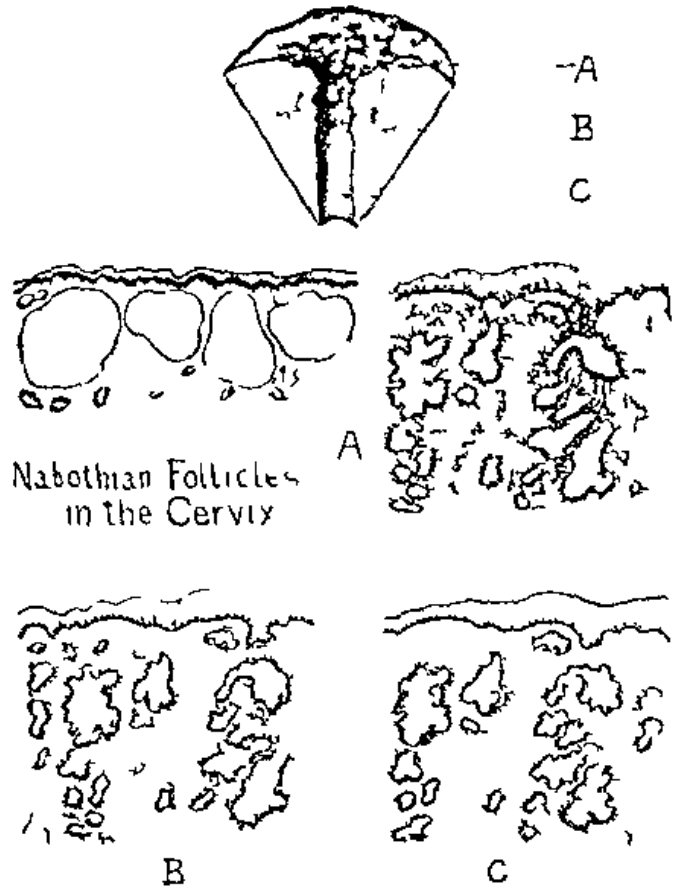


Fig. 1.—Median sagittal sections at different levels of excised cervix, showing the extent to which the infected glands reach.

PROCEDURE

With the patient anæsthetized and placed in the lithotomy position the cervix is caught with a tenaculum and an incision made on each side beginning at the external os producing a complete bilateral laceration and making anterior and posterior lips (Fig. 1). An incision is then made through the mucous membrane of the portio vaginalis of the upper lip encircling the limits of the eroded area. The mucous membrane of the portio is now pushed back for a distance of a centimeter or more if necessary to secure a sufficient cuff of the mucous membrane completely to cover over the excised area of cervical tissue. Then while traction is being made on the upper lip the entire granular area surrounding the upper portion of the cervical canal is coned out with the scissors. All the infected portion of the canal can thus be excised by direct inspection and there is no necessity for fearing that either too much or too little of the cervical canal will be removed. A suture of No. II chromic catgut on a full curved needle is placed through the previously liberated flap of vaginal mucous membrane. The suture begins at either angle and pulls up this flap in a submucous stitch this to continue around (Fig. 3) until the opposite angle is reached. The angle stitch goes through the entire cervix beginning in the cervical canal and coming out through the flap of mucous membrane. A similar stitch through the other angle completes the upper suture (Figs. 4 and 5). When this suture is tied the vaginal flap originally liberated is now inverted into the hollowed out shell of the upper lip of the cervix. This maneuver brings the cuff of vaginal mucosa into contact with the cervical mucosa (Fig. 6) and thus completely covers all the denuded area and furthermore substitutes healthy vaginal mucosa as a lining for the infected cervical mucosa which has been removed. The cone of the lower lip is then excised in a similar manner under direct vision (Fig. 6) and a suture similar to that described above is introduced (a semi-purse string submucous stitch Fig. 7). When this suture is drawn taut (Fig. 8) the operation is completed and a new canal created.

CONCLUSIONS

We have done this operation a sufficient number of times to form some definite conclusions as to its value.

1. In the first place it cures the leucorrhœa.
2. A trachelorrhaphy of this type does not interfere with normal dilatation during labor.
3. The relief of the focal infection cures the posterior parametritis in the uterosacral ligaments and cures the lumbosacral backache which is such a prominent symptom in chronic endocervicitis.

FRACTURES OF THE SHAFT OF THE FEMUR

By WILLIS C CAMPBELL MD NASHVILLE AND J S SPEED MD MEMPHIS TENNESSEE

In spite of the vast experience surgeons have had with fractures of the femur during the last ten years both in civil practice and in army hospitals the results are far from satisfactory in many cases In a large measure this is due to the inherent difficulties of this class of injury which make it one of the most serious problems the surgeon has to face and which place fractured femur high in the ranks of permanently disabling injuries Much work has been done to formulate some standard method of treatment which will improve the result But the multiplicity of procedures now employed shows that little progress has been made The two methods most in use are the gradual reduction by suspension and traction in connection with the Hodgen frame and immediate reduction and plaster cast Both have their advantages and disadvantages The traction method is the one used almost exclusively in the large institutional centers because of its relative ease of application and because very few general surgeons are really adepts in the use of plaster of Paris A poorly applied cast or one composed of poor plaster is worse than no treatment at all for it does not hold the bones in position and covers up deformities which might otherwise be seen and corrected When properly used however the cast is the most reliable method of fixation at our command We base this statement on the results we have obtained by its use in the treatment of 155 cases of fractures of the shaft of the femur From personal observation and from a careful study of the reported results in the literature we do not see any reason to change our views All of our cases are not perfect by any means but we can assure you that the same thing is true often to a much larger extent with any other method used

In normal healthy bone repair begins in from 2 to 4 days and is active at the end of 10 days It is of course much more rapid in children than in adults Fractures should be reduced as soon as possible as all splinted callus interferes with reduction swelling is prevented and no callus is wanted Callus once broken up never forms as rapidly again and repeated reduction and disturbances of callus is one of the most common causes of non union A plaster cast can be put on a fractured femur before it swells with perfect safety in 99 per cent of the cases provided you know and watch for the danger signs in the other 1 per cent

Fractures of the shaft of the femur are usually due to direct violence and occur during the period of greatest physical activity They may occur at any part of the shaft but the middle third is the most common site about 60 per cent in this series with 20 per cent each in the upper and lower third The fractures are usually transverse or spiral Greenstick fractures are rare even in young children

The deformity usually seen is for the shorter upper fragment to be displaced forward and slightly abducted This is due to the pull of the psoas iliacus pectineus and abductors of the thigh which have their insertion on the upper third or on the trochanters This is important to remember in reducing such fractures for the distal fragment over which you have control must be brought into line with the short proximal fragment over which you have very little control Interposition of muscles or fascial bands between the fragments is a very rare cause for failure of reduction or non union Kellner reports 6 cases proved by operative reduction in a series of 7 fractures This is an unusually high percentage but all of these cases were treated by the gradual traction method which favors the healing of soft parts across the site of the fracture

One of the greatest objections to the plaster cast is that the knee and ankle joints are necessarily immobilized for a long period of time We know from experience that this causes atrophy of the articular cartilages and contractures of the soft parts about the joint resulting in a certain amount of stiffness in all cases In children this clears up in a few days but in adults it may cause a permanent limitation of motion in the joint About 5 per cent of our cases had some permanent loss of motion in a few of which it was sufficient to seriously impair the joint

CAUSES OF NON UNION

The most common cause for non union in simple fractures is lack of reduction If the ends of the shaft are placed reasonably close together union is almost certain to follow Repeated attempts at reduction with the consequent disturbance of callus is malposition partner in crime A few cases may be due to systemic disease or muscle interposition Compound fractures with infection are frequently followed by non union particularly where there is loss of bone



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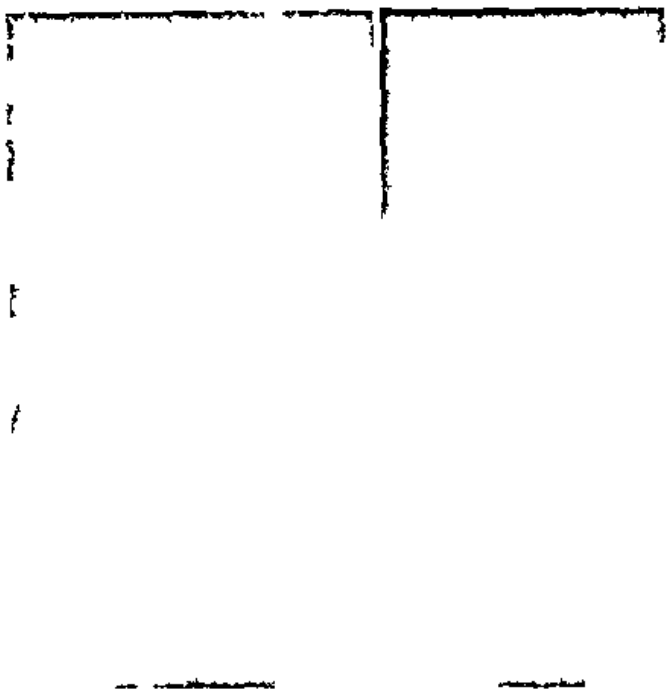


Fig 1 B A t op ten r a l lateral 1 ws f same p t e t a in l sh wi g good r d ction with end to e d ppx t on d sol d bo y u on

METHOD OF REDUCTION

An orthopedic table with the usual attach ments for extension and counter traction is an absolute e sential Combined with this should be an X ray equipment which allows frequent fluoro scopic or plate control while the fracture i being reduced and before the cast is applied thus assur ing an exact knowledge of the position of the frag ments at all times The patient is given a general anæsthetic usually ether and when the muscles have become thoroughly relaxed the manipula tion is begun The unaffected limb is fixed to the foot piece under moderate traction The affected thi h i then flexed to about 45 degrees and slight ly abducted as this is the normal po ition for the upper fragment to assume becau e of the pull of its muscular attachments As we have very little cor rol of this fragment particularly when it i short the lower fragment must be maneuvered up to meet it The fra ments are next angulated un der l ht traction until the ends of the bone im pinge and can be locked after which the thigh i radually straightened until the normal antero-po terior and lateral alignment is obtained If th fra ments slip by one another the maneuver is repeated The position is now checked with the X ray and the limb fixed in this po ition by trac tion on the foot and counter traction under the knee and at any other place that is necessary A plaster cast is applied extending from the upper chest to the toes on the affected side and extend ing to the knee on the unaffected side The cast is removed at the end of 2 weeks in children and 3 weeks in adults the alignment of the leg care fully in pected the po ition of the fragments checked by X ray and the joints gently manipu lated Any angulation can easily be corrected while the callus is yet soft and the position of the joint can be changed thus preventing future stiffne s Careful observance of this simple pre caution will often save much embarrassment in the future after solid union has taken place A second pica ca t i now applied usually only taking in the injured limb if there is satisfactory union and good position

No set rule of thumb can be applied to all cases each one being a problem unto itself in obtaining and h lding the correct reduction Much depends upon the shape of the end of the fragments Ob lique fracture and transver e fractures with everal sharp points and notches are reasonably easy to hold in position if you get a good end to-end approximation The most difficult fracture to hold i a short smooth slanting break which is almo t impossible to lock at time of reduction and which i very liable to slip by during the first week after the cast has been applied We must often be satisfied in thi type with ⁄ to 1 inch

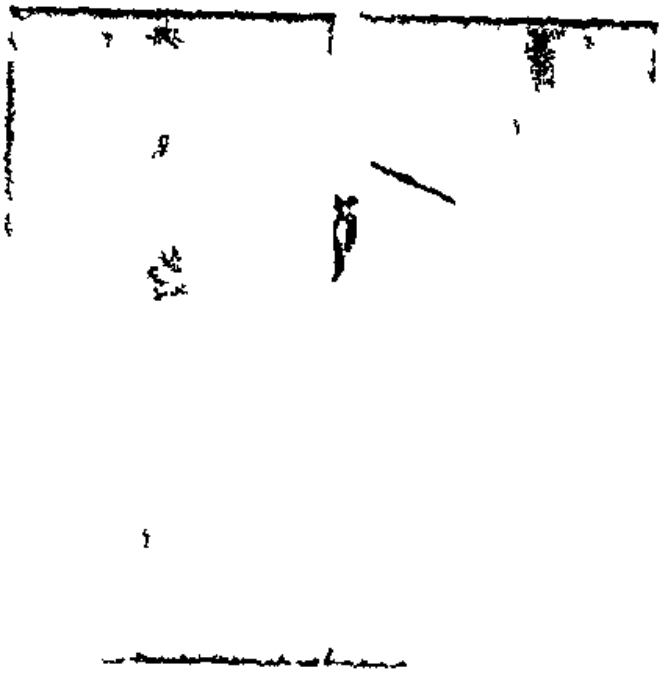


Fig. 1.—Result of fifteen days' traction in the treatment of a fracture of the middle third of the femur.



Fig. 2.—Result of open reduction in a fracture of the middle third of the femur. Operation was performed four weeks after injury. Excellent position and apposition of the fragments. Angulation and rotation corrected without leaving a gap at the point of fracture.

vertical and shortening, provided the anteroposterior alignment is good. The question to be answered is whether it is not better for the patient to have a straight leg one inch shorter than to subject him to the danger and uncertainty of an open reduction. Open reduction regardless of the type of internal fixation used does not give 100 per cent cures by any means. An inch shortening may easily be compensated for by tilting the pelvis and the functional result be entirely satisfactory. Experience with several thousand fracture cases has convinced us that while perfect anatomical reduction should be our ideal and every justifiable means used to obtain it, still a satisfactory functional result is what the patient wants and his life and limbs should not be endangered to obtain beautiful X-ray plates.

TIME OF REDUCTION AFTER THE FRACTURE

If the case is seen within the first twenty-four hours and no undue swelling has taken place, reduction is done immediately and a plaster cast applied. We have had no serious consequence due to swelling after the cast has been applied. In several partially united cases where it was necessary to use considerable manipulative force and traction it has been necessary to split the cast. There is no difficulty in determining when this is necessary if the patients are given the ordinary postoperative attention due any case. In cases where there is excessive swelling present when the case is seen we postpone the reduction to make the manipulation easier and to prevent the cast from becoming loose when the swelling recedes. We have found no difficulty in making sufficient extension to secure end to end apposition of the fragments when the muscles are thoroughly relaxed under an anesthetic. Compound fractures are of course kept in an extension splint until all chance of infection has subsided.

We have used the method of treatment just described in all our acute fractures of the shaft of the femur, numbering 130 cases, and have used open reduction only in cases of old ununited malposition or nonunion. There have been 23 cases of the latter type, making 153 cases upon which this report is based. The series has been divided into two groups, children and adults, as the difficulties of treatment and the end result are decidedly different. The series does not include fractures of the neck of the femur, intertrochanteric or epitrochanteric fractures or epiphyseal separations, as we feel that these offer different surgical problems and should not be confused with fractures of the shaft. Each group has been subdivided into simple fractures, compound



Fig 3 A Anteroposterior and lateral view of fracture of middle third of femur and dislocation of hip

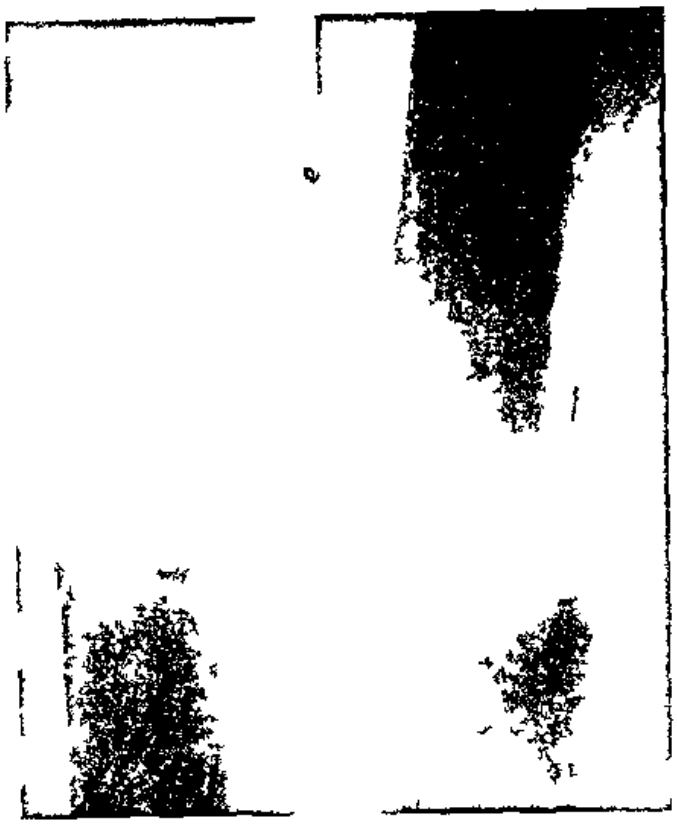


Fig 3 B Anteroposterior and lateral view of same patient showing good reduction and early callus formation

fractures and fractures requiring open operative treatment

Fifteen years has been arbitrarily chosen as the dividing line as at about this age the physical development changes from the child to the adult type Of the 153 cases sixty seven fall into the child group the ages ranging from 5 weeks to 15 years. The location of the fracture was in the middle third in 60 per cent and 20 per cent each in the upper and lower third of the shaft 80 per cent were of the transverse type 15 per cent spiral or oblique and 5 per cent green stick Forty-eight or 70 per cent were in boys and 19 or 30 per cent in girls This is in marked contrast to the adult group when only 4 7 per cent were in women This however is to be expected as the physical activities of boys and girls are very much the same while in adult life relatively few women are engaged in hazardous occupations The number of automobile accidents may change this ratio

The second or adult group consists of 86 cases ranging from 16 to 71 years Here again the middle was the common site of injury and the transverse the usual type of fracture the percentages being practically the same as in children

The results have been classified as perfect when there was solid union with end to-end apposition of the fragments and no angulation or shortening good when there was less than 1 inch overlap or slight angulation but with a satisfactory functional result poor when there was non union or excessive deformity (shortening over 1 inch or bad angulation)

SIMPLE FRACTURES

1—*Children* Fifty seven cases were of the simple acute type and were treated by the routine reduction and plaster cast Fifty or 87 7 per cent were perfect 6 or 10 5 per cent were good and 1 or 1 8 per cent was poor The case classed as poor was in a boy 14 years old who had a delayed union with three fourths inch overlap One month after he began to walk he had a second fall with refracture As union was again delayed after 6 weeks in cast an open reduction was done to secure end to end apposition and to freshen the fragments Solid union was obtained We have experienced very little difficulty in obtaining a satisfactory reduction and in holding this reduction afterward by means of the usual cast Prompt and adequate callus has been the universal rule in simple fractures and good firm union has usually taken place at the end of 2 to 3 weeks when the original cast is removed for inspection The callus is still malleable enough to allow slight correction in position if necessary Many of these cases belong to the unfortunate middle class of patients who are not wealthy enough for private rooms in a hospital for from 5 to 8 weeks or not poor enough to seek advantage of the charity ward A child in a cast can be taken home even to neighboring

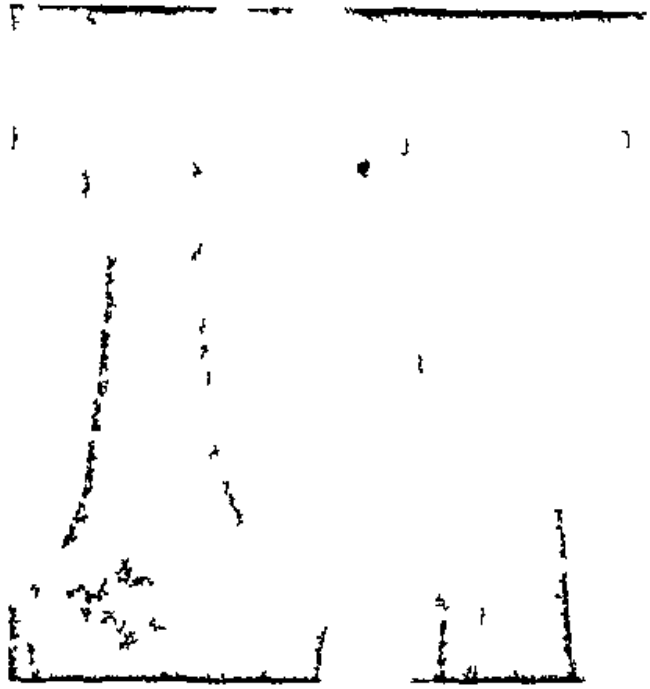


Fig 4 A Anteroposterior and lateral views showing fracture of lower third of femur in a child

cities after about 10 days without fear of displacing the fragments This of course is out of the question if the fracture is being treated by the extension method which requires daily and often hourly adjustments Children all stand casts very well and we have never had to remove one for intercurrent or complicating disease Immobilization of joints over a long period of time is not a factor of serious importance in children Many of the cases here classed as good will eventually become perfect for young growing bones have a marked ability to straighten out overlaps and angulations and even to make up by compensatory overgrowth a moderate amount of shortening A most interesting article has been published in which the author states that fractures of the long bones in children often cause a stimulation in growth which may result even in the affected limb becoming longer than the normal We have observed one such case Period of disability is from 6 to 10 weeks open reduction necessary in only 1 case No non unions

B— *Adults* This group includes 54 cases ranging from 15 to 71 years Here again the middle third was the common site of injury and the transverse the usual type of fracture Thirty two or 60 per cent were perfect 19 or 35 per cent were good and 3 or 5 per cent were poor One case died before an attempt at reduction was made from a fractured skull received at the same time as the fracture of the femur This gives a good functional



Fig 4 B Anteroposterior and lateral views of same patient in A 4 weeks later showing good reduction and clinical union

result in 95 per cent of the cases which compares favorably with any results reported There were no cases of non union and it was not necessary to do an open reduction in a single case which were received for treatment in the acute stage that is within 3 weeks after the injury Of the 3 cases classed as poor 2 were old men of 60 and 62 years In these the cast broke allowing slight angulation and 1/ inch shortening and the general condition of the patients was so poor that it was not advisable to do further reduction or open operative work In one the knee became so stiff as permanently to impair the function of the leg Another patient originally classed as a non union recently returned with a good leg He presents so many points of interest that his case is worth reporting in detail

The patient a boy 7 years received a broken leg fracture of the middle third of the femur in an automobile accident He was treated immediately with the cast and crutch method and obtained a perfect result as shown by the accompanying roentgenograms Nothing unusual was observed in the course of healing but the point of interest in the history was that the boy fell from the roof of a house on the opposite side of the street from his home and landed on the pavement in front of the house He was picked up by a passing motorist and carried home in the car The mother was overcome with joy at seeing her son alive and uninjured and rushed out to the car to embrace him Thinking he was standing on the ground she threw her arms around his neck and lifted him from the floor of the car The boy's leg was broken in the fall from the roof and the fragments were displaced as shown in the roentgenogram taken at the time of admission to the hospital The leg was placed in a cast and the boy was allowed to walk on the leg at the end of 4 months



Fig 5 A Anteroposterior and lateral views showing fracture of lower third of femur in an adult

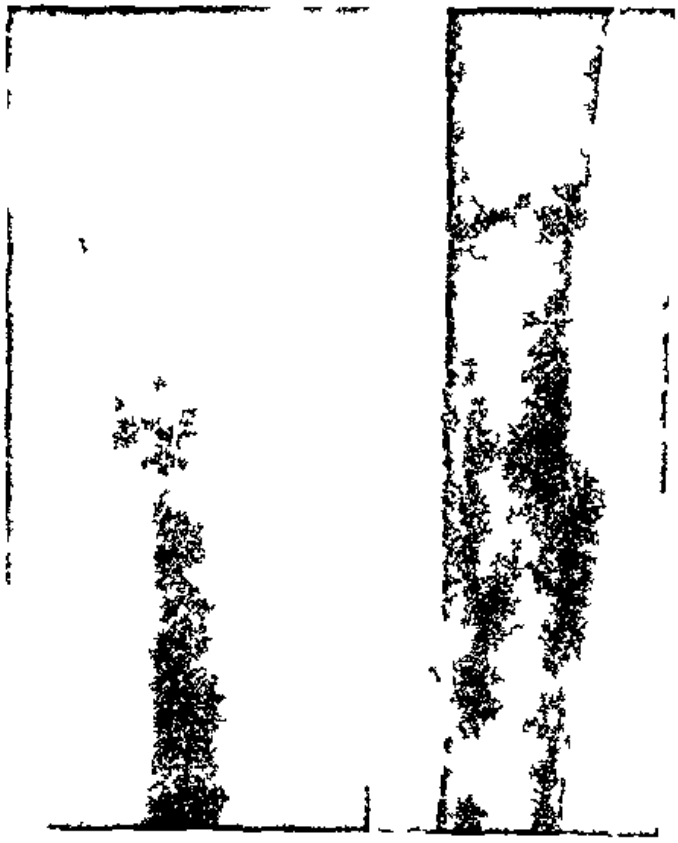


Fig 5 B Anteroposterior and lateral views of same patient showing final result good reduction Perfect functional result

th solid unio good lignment d nly 1 inch sh t ing With t amou t of motion betwee the f agme t t th e d of we ks it pp ar d if it wer going to b ca of pe ma ent n o The f t th t ith u ted mply sh hat m y b c omplish d by atu e e r an old subject if sufficie t t m s allowed n l p op pl nt g empl y d

It will be noted that 19 or 35 per cent of these cases are cla sed as good that is they had an overlap and shortening of not over 1 inch or a very slight angulation Alignment is easily controlled or corrected if the case is properly followed by observation and X rays Overlapping however has proved a much more difficult problem to control especially in the smooth oblique type where it is often impossible to maintain end to end apposition and an overlap of one half to three fourths inch occurs resulting in permanent shortening and a slight increase in the period of disability The functional result however is entirely satisfactory as the patient is able to resume any type of occupation and soon learns to walk without a limp It may be that in the future we will employ open reductions in this particular type of case but at present we prefer a slight shortening to the risks and uncertainty of open reduction Sixty per cent perfect and 35 per cent good gives 95 per cent satisfactory functional results This is a very good prospect to offer a man who has had so serious an injury

COMPOUND FRACTURES

Here of course the first consideration is the infection which is liable to occur the reduction of the fracture being temporarily a secondary consideration It is an equally bad mistake to understate the dangers of an infection and attempt any strenuous manipulation for reduction causing increased damage to the soft parts or to over estimate the danger and do an immediate extensive debridement unnecessarily traumatizing the soft parts and sacrificing bone fragments which may be needed to bridge the defect between the fractured ends and prevent shortening With the case in a hospital under careful observation adequate drainage can be established at any time Debridement was of invaluable service in war injuries where it might be necessary for a patient to go for several days without dressings while being transported to the rear where doctors were changing daily and where the incidence of gas bacillus infection was very high but these conditions should not apply in civil practice Examination of our records of compound fractures of all bones shows that 75 per cent healed



Fig 6 A t p sten r ı h gm l ıo f y ars durat n of middl third of f m



F 6 B ınter po t rı w of sam p t t as ı 4 ft p n educt ınt ropo ter l gnm t p fect Th l t l w h ws ant roposte gul t but s ld n on E c ll t functı l result th ly thr e f thı ch sh t nı g

without infection In femurs 45 per cent healed *per primam* included in which are 5 cases of gun shot fractures with the usual comminution There was only one gas bacillus infection in our compound fractures of the femur This was fatal as is usual when the thigh is involved Of course it is perfectly obvious that in some cases when there is extensive laceration and crushing of the soft parts infection is inevitable and the proper debridement may be immediately done

TREATMENT

The routine method of treatment in compound fractures is to clean up the external wound with iodine to apply a sterile hot wet dressing of ⅛ to 1 per cent carbolic solution and to place the limb in a Thomas splint with traction Fifteen hundred units of tetanus antitoxin is given on admission If no infection has occurred at the end of 10 days the fracture is reduced in the usual manner and a plaster cast applied In no case *has an infection flared up after this procedure*

If infection occurs during the first 10 days adequate drainage is established either by enlarging the original wound or by counter incisions Fragments of bone are removed only when they have been thrown off as a definite sequestra It is a well established fact that bone fragments and even bone grafts *may live and be incorporated* into a callus even in the presence of an active infection

RESULTS

There were six compound fractures in children and fourteen in adults all of which present very much the same problems of treatment and will

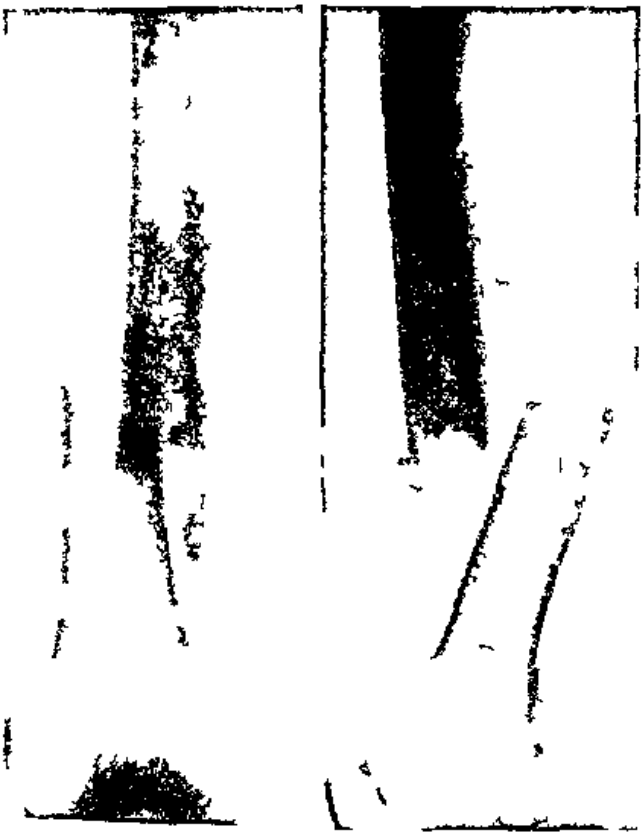


Fig 7 A Anteroposterior and lateral view of fracture of lower third of femur in adult

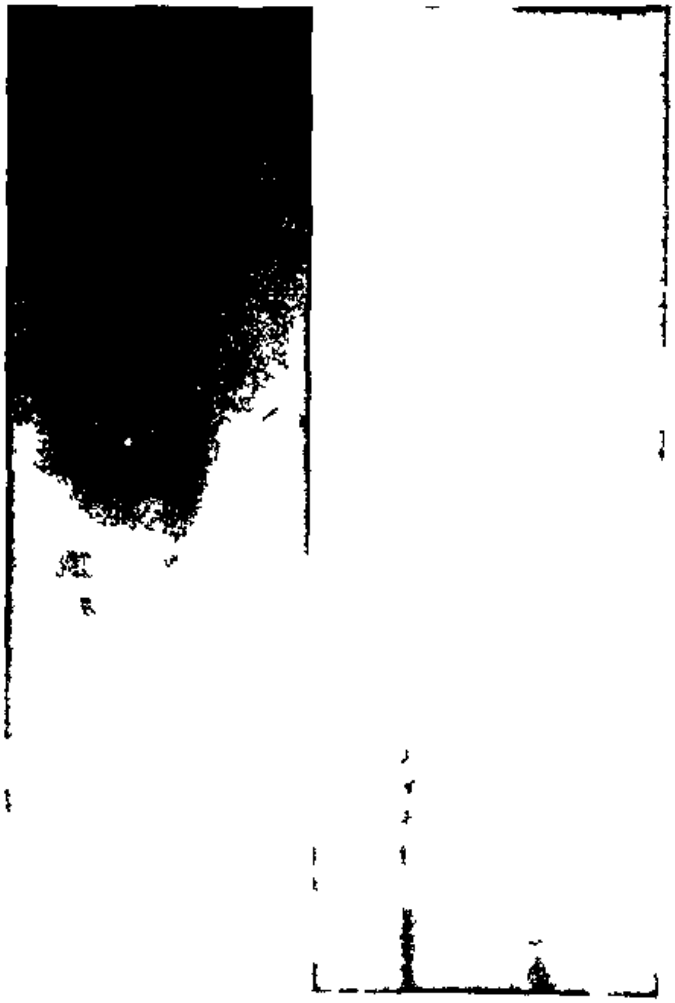


Fig 7 B Anteroposterior and lateral views of same patient six weeks after reduction end-to-end apposition of fragments locked good alignment

be discussed together the results depending chiefly upon whether or not infection occurred Eight cases healed *per primam* The result was excellent in six and good in two Nine cases became infected and the results here depended upon the severity of the infection and upon the amount of bone lost by comminution and necrosis Three cases had less than 1 inch shortening and healed after a few weeks drainage Four cases had over 1 inch shortening three developing a chronic osteomyelitis requiring secondary operations and permanently impairing the function

Two cases were fractures complicating an active osteomyelitis as pointed out in a previous paper[1] union occurs in fractures through an involucrum very much the same as in normal bone except that the production of callus is somewhat delayed Both cases were in children one obtaining solid union in 2 months and one in 4 months

One case died of an extensive gas bacillus infection 2 days after injury

In no case did non union occur

OPEN REDUCTIONS

As previously stated in this paper no open operative reductions were done on the acute

fractures in this series There were 23 open reductions 5 in children and 18 in adults These came for treatment at periods of time varying from 3 months to 7 years after the original injury and had either non union or union in malposition An effort to determine the cause of the bad results showed that most of them had been treated in the home with poor and insufficient splints or simple extension and no real attempt at reduction or fixation had been made

Of the 5 children 3 had vicious union and 2 non union Both non unions were in older children 13 and 15 years old who had received practically no treatment resulting in overlap and bad angulation and wide separation of the ends of the fragments with scar tissue healed across the gap In the first a case of 6 months duration the scar was dissected out the ends of the bones freshened and notched and a cast applied In the second case of 2 years duration there was considerable atrophy of the bone so a sliding graft



Fig. 8.—A. Anteroposterior view of fracture of middle third of femur in a boy.

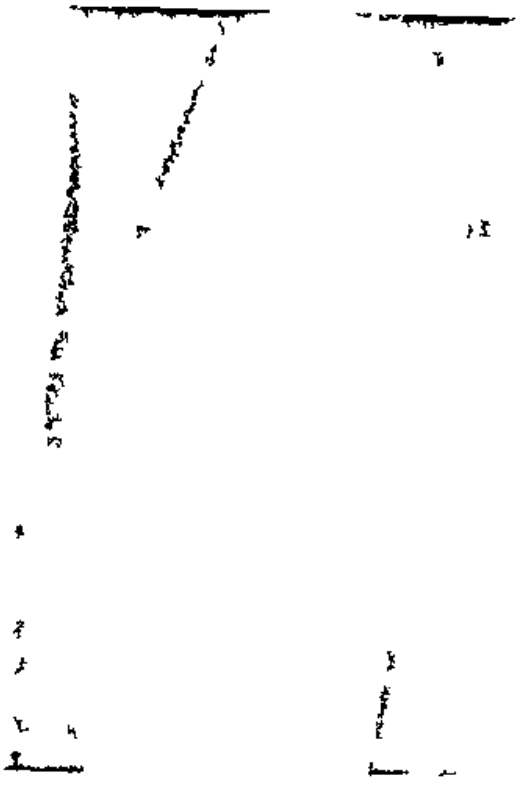


Fig. 8.—B. Anteroposterior and lateral views of same patient, 3 months later, showing solid union and perfect position.

was done as an extra precaution. Both promptly united and an excellent result was obtained. In the three vicious unions an osteotomy was done through the point of union, the ends of the fragments mobilized, freshened and notched together. It was necessary to resect about ¾ inch in one case to obtain end-to-end apposition. It is well to remember that bone grafts in children are rarely indicated and that abundant callus formation can be depended upon even in old fractures if reduction is maintained.

The adult group consists of 18 cases, 7 non-unions, 10 vicious unions and 1 delayed union in *malposition*. Age was *of no consequence* as most of the cases were under 30 years. The middle one-third was the site in 60 per cent, practically the same as the incidence of fractures in this part of the shaft. All of these cases present a serious surgical problem, for any method of operative treatment adopted is fraught with difficulties and dangers and operative treatment is the only one that offers the possibility of a good functional result. The ingenuity of the surgeon and the endurance of the patient are often taxed to the utmost. Most of the cases are of a long duration with from 1 to 4 inches overlap and permanent contractures and shortening of the soft parts and often extensive scar formation around the ends of the fragments. Atrophy of the shafts and eburnation of the ends of the fragments add to the difficulties. After the fragments have been mobilized it is dangerous to attempt to overcome more than 1½ inches shortening by stretching of the soft parts, due first to the added shock to the patient and second to the extreme tension under which the fragments must be locked together. The two operative deaths in this series were due chiefly to the prolonging of the operation and the increase of the operative shock by effort to overcome excessive shortening. (A two-stage operation with a preliminary osteotomy and gradual traction extension has not proved satisfactory.)

All operations should be performed under a tourniquet as it is impossible to control bleeding without a prohibitive loss of time and even then enough blood will be lost to add materially to the shock. Sufficient skilled assistance is an essential.

The advantages and disadvantages of the various operative procedures used for treating malunions and non-unions is too comprehensive a subject to be discussed in this paper, but a brief summary will be given.

Of the 10 cases of malunion simple osteotomy at the site of union with freshening and notching of the ends of the fragments and resection of sufficient bone to secure end to-end reduction was done in 8 cases All obtained solid union and 5 with less than 1 inch shortening and 1 with over 1 inch shortening and some angulation In this case the general condition of the patient after operation required removal of the cast The degree of shortening was dependent upon the amount of bone necessary to resect because of the original overlap There were no operative deaths In one case we were able to gain about 2½ inches in length but as a general thing 1½ inches was all that could be safely gained

Autogenous bone grafts were used in all 7 cases of non union both to secure certain internal fixation and as a method of stimulating callus formation as these cases had already proved to be deficient in this respect The massive tibial graft fixed in position with autogenous bone nails and reinforced by pieces of medullary bone rich in osteogenetic tissue [1 d2] proved to be the most satisfactory type of graft Four cases obtained excellent results One case became infected and the graft was lost but he obtained solid union after 6 months This case had originally been a compound fracture but had been entirely healed for over 8 months and pre operative baking and massage had failed to produce a reaction It simply proves what has so often been pointed out by operators doing reconstructive war surgery that an old infection may be lighted up even after many months of apparent inactivity

There were two operative deaths in this group both cases of several years standing with marked overlapping of the fragments The fatal post operative shock in each was due to prolonged effort to overcome the excessive shortening We have adopted a working rule that 1⁄ inches is a safe amount of shortening to overcome and 1 hour and 30 minutes the outside time limit for any operative procedure on a femur

One is often asked what will be the period of disability in a fractured femur We have found that the average period of time in an adult case which does well is about 4 months However in many cases where there is a malunion or delayed union or infection the disability may extend over a period of one or two years or may even be permanent Ten per cent of the acute adult group were totally disabled for over 6 months

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CONCLUSIONS

1 Fractures of the shaft of the femur in children properly treated give excellent results

2 Callus in children is usually exuberant and non union even in the presence of infection or malposition is very rare

3 Young growing bones have the ability to correct even marked deformities

4 Immediate reduction and plaster cast is the ideal method of reduction in children because (1) of the uniformly good results (2) the ease of handling and caring for the patients and the certainty that lack of co operation on the part of the child cannot displace the fragments as often happens with the traction treatment

5 In adults the plaster method properly used gives us as good or better results than any other method

6 Simple fractures should be reduced immediately after injury

7 Early mobilization of joints and massage of the soft tissues is of great importance in all fractures but satisfactory reduction and union should not be endangered by too great an enthusiam in this respect

8 Compound fractures of the femur will heal without infection in 50 per cent of the cases

9 Non union is due chiefly to malposition

10 Open reductions are rarely indicated in acute fractures of the femur

11 Autogenous bone grafts are the best method of internal fixation in connection with open reductions internal fixation is rarely indicated in children even in non unions it is indicated in malunions in adults when reduction is difficult to maintain it is always indicated in non unions in adults

12 Fractures of the femur give long periods of disability and unless properly treated are liable to result in permanent impairment

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THE OPERATIVE TREATMENT OF CEREBELI AR ABSCESS OF OTITIC ORIGIN[1]

Important Mechanical Factors

By WELLS P EAGLETON M D F A C S Newark N J

PREMISES Experience has shown (1) that in a considerable number of the cases the cerebellar abscesses are not reached during operation because of their positions (2) that many abscesses which have been successfully drained at operation have at postmortem been found to have been but imperfectly evacuated because of the irregular shape of the abscess cavity and (3) that a very small percentage of the total number operated upon ultimately recover for although many observers report as high as 50 to 60 per cent a large compilation of cases gives but 10 5 per cent of recoveries

However an analysis of the postmortem records in 131 ca es of cerebellar abscess would apparently show that the position of 81 per cent of all cerebellar abscesses of otitic origin should be amenable at least theoretically to surgical treatment

By directing attention to the mechanical factors encountered at operation and by present ing an operative technique adapted to meet them I hope will lead (a) to a decrease in the num ber of unsuccessful explorations and (b) to an in crease in the percentage of ultimate recoveries

SYNOPSIS

Mechanical factors 1 The position of a cere bellar abscess depends largely on the (a) path by which the infection reaches and enters the dura and (b) the pathological process by which the in fection is conveyed into the dura

2 The difficulty in obtaining an exposure through a clean area sufficient to admit of proper inspection is due to (a) the small size of the cerebellum and (b) the position of the lateral sinus The e anatomical limitations may be further increased during operation by (c) ex cessive cerebellar herniation

3 The increa ed intracranial pressure from the ab cess with the associated disturbance of the cerebrospinal fluid system circulation occasions a displacement of the brain stem downward into the foramen magnum and the increased size of the affected cerebellar hemisphere causes a dislocation of the cerebellum and the contiguous brain stem away from the median line

In view of the immediate fatal effect which may follow further cerebral displacement during operation the operative attack should be planned (1) to enter the abscess at its nearest approach to the dura so that the manipulation may cause the least possible damage to the cerebellar tis sue (2) to prevent excessive cerebellar herniation by adapting the surgical manipulations to the abnormal position and (3) safely to reduce the increased intracranial pressure

Operative technique These conditions may be met theoretically by conducting the exploration through an enlarged clean operative field To obtain this it is necessary (1) to perform a primary complete uncovering of both cerebellar hemispheres continued laterally on the affected side until the homolateral sinus is fully expo ed (2) to obliterate the sinus by the invulsion of its outer wall into its lumen in its upper portion and by an encircling ligation below and (3) to incise the dura through the sinus and to enlarge it anteriorly or posteriorly thus exposing an area otherwise inaccessible which allows ex ploration inspection and proper evacuation through a clean field

THE PREDOMINANCE OF AN AURAL ORIGIN IN CEREBELLAR ABSCESS

The postmortem records of 131 cases of cerebellar abscess compiled by the author show the origin in 123 cases of which 103 (about 83 per cent) were of aural origin

The importance of a pre operative diagnosis of the pathological process A knowledge of the method by which the infection reaches the cere bellum is of surgical importance as a pre-opera tive diagnosis of the exact pathological process present enables the surgeon in a certain pro-portion of cases to va ue the ite of the abscess sufficiently to make the operation essen tially therapeutic rather than explorative

1 *Adjacent cerebellar abscess* of aural origin may be a result (a) of direct extension of the suppurative process With such an origin the abscess is always situated contiguous to the area of bony caries a fistulous tract extending from the inflamed dura into the abscess cavity within the brain Or it may result from a (b) retrograde thrombophlebitis (or perivasculitis) of a cere

[1] Abstract f paper read before the Tenth In ernational Otological Congress in Paris July 8 9

bellar vein the abscess being situated generally within the cerebellar substance itself in the neighborhood of the area of primary bony involvement Here the internal surface of the dura usually is not affected microscopically there being no adhesion between it and the cortex The cerebellar cortex when involved becomes so from *extension of the abscess outward*[1]

An adjacent cerebellar abscess can be diagnosed in a large number of cases by a vague chill followed by a gradual course interrupted frequently by a latent period *characteristic of localized* cerebral suppuration

2 *Non adjacent cerebellar abscess* When the abscess is situated at a distance from the original area of suppuration in the ear it may be caused by the aural infection having given rise to a thrombophlebitis of the sigmoid or petrosal sinus which in turn conveys the infection to the cerebellum Here the intradural invasion may originate (a) from direct extension through a necrosis of *the* inner wall of the sinus in which case the abscess is situated chiefly on the cerebellum (superficial brain necrosis) More commonly however lateral sinus thrombosis causes cerebellar abscess (b) by an extension of the infectious thrombophlebitis of the sinus into one of the small cerebellar veins emptying into it which latter is the immediate occasion of nutritional death of the cerebellar tissue and abscess formation When of such an origin the cerebellar abscess is generally situated in the cerebellar substance itself[2]

A clinical preoperative diagnosis of inter *current (tertiary) cerebellar abscess is possible* at times by a careful study of the history revealing a gradual onset of cerebral symptoms preceded by evidence of a blood stream infection (chill irregular temperature positive blood cultures etc)

To the group of non adjacent abscesses also belongs metastatic cerebellar abscess These abscesses originate from an infective nidus which after being liberated from a distant focus and

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circulating free in the blood stream is suddenly deposited *in a cerebellar cortical or subcortical* vein causing obliteration and infective nutritional death of cerebellar tissue A metastatic abscess[3] is generally associated with an apoplectiform type of onset of cerebral symptoms

Lastly cerebellar abscess associated with aural suppuration may be of traumatic origin from exploratory punctures of the dura from blows on the head or from operative proceedings on the mastoid The trauma in operations on the *mastoid (especially in the presence of increased* intracranial pressure) may cause a lowered vitality and hemorrhage into the cerebellar tissue the suppurating ear supplying the infection necessary for abscess formation (17 9 10 11)

All of these authors report the abscess as a result of trauma to the head the primary focus of infection being distant from the brain—in Sabares (17) case in the leg in Gibb (9) case *in the lung* in Mairet Durand Seigneurin and Monez (10) case in the antrum of Highmore and in Massary and Girard's (11) case in the pleura

I am persuaded that the conclusions associated with chiselling during a radical mastoid operation is not infrequently the cause of cerebellar abscess for how otherwise can be explained the large number of reported cerebellar abscesses which have immediately followed a radical mastoid operation There is also evidence that hæmorrhage within the substance of the brain *contiguous* to an area of suppuration can be the origin of an abscess In Fronks's (8) case the probable cause *of abscess was rupture of a small cerebral* vessel due to or coincident with the firing of a gun the resulting clot passing through the usual liquefying process and later becoming infected through the blood stream from some secondary focus most probably from carious teeth

THE OPERATIVE IMPORTANCE OF PRE-OPERATIVELY DIAGNOSING THE ROUTE OF INVASION OF THE CEREBELLUM WHETHER BY THE PETROUS PYRAMID OR THE LATERAL SINUS

It is a clinical fact that in the large majority of cases cerebellar abscess of aural origin situated in the vicinity of the seat of primary infection in the bone (Trautman triangle labyrinth) or of the thrombosed lateral sinus consequently a diagnosis of the path through which the suppuration *ultimately reaches the cerebellum from* the external parts may be of the greatest surgical assistance Our present knowledge of cerebellar

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localization is so rudimentary that the surgeon can only attempt a tentative pre-operative diagnosis of the position of the abscess as located either (1) in the surgical anterior cerebellar triangle or (2) in the posterior two thirds of the posterior fossa

In many cases such a differential diagnosis may be accomplished by a careful study of the history and a complete neurological examination which must be associated with functional tests of the static and auditory labyrinths with blood and cerebrospinal fluid examinations and with previous operative findings Generally when the labyrinth can be definitely established as the tract of infection the abscess is situated in the anterior surgical triangle but when the abscess originates from sinus thrombosis its location generally is either in the cerebellar hemispheres or on one of the cerebellar surfaces

In a large number of cases even this crude localization is impossible although there is no doubt that the majority of cerebellar abscesses of otitic origin are primarily in the anterior surgical triangle

FREQUENCY OF LABYRINTHINE ORIGIN OF CEREBELLAR ABSCESS

The records of the 125 autopsies[1] show that the labyrinth was the cause of cerebellar abscess of aural origin in 57 cases (46 per cent) of which 32 (25 per cent) were by preformed ways thrombophlebitis of the lateral or transverse sinus was the cause in 42 (34 per cent) an associated labyrinthitis and sinus thrombosis occurred in 13 (10 per cent) and caries of the mastoid preceded the cerebellar suppuration in 25 (20 per cent) In many of the last mentioned cases the labyrinth was undoubtedly affected but as no proper examination of the labyrinth was made functionally during life and none at postmortem the real causative lesion of the abscess was overlooked

Experience leads me to believe that 60 per cent of all cerebellar abscesses originate in the labyrinth And as cerebral abscesses but very rarely originate in the labyrinth because the physiological connections of the labyrinth are entirely within the posterior fossa the presence of a dead labyrinth with unmistakable symptoms of brain abscess is presumptive evidence that the intracranial suppuration is probably situated in the cerebellum

Thus by a pre operative diagnosis of the path of infection the surgeon may be able to decide whether the cerebellar abscess is situated (1) on or near the anterior surface of the cerebellum (when the infection entered through the posterior surface of the petrous pyramid) or (2) in or on the posterior two-thirds of a lateral hemisphere (when the infection originated from the lateral sinus)

Associated cerebral and cerebellar abscess The diagnosis of an adjacent temperosphenoidal abscess does not necessarily exclude an associated cerebellar abscess as statistics show that in about 3 per cent of all cases there is present an abscess in both the middle and posterior fossæ Moulinguet (13) encountered 3 cases of abscess cavity in both the cerebrum and cerebellum in 6 cases diagnosed as temperosphenoidal Damade (6) in 459 brain abscesses found 11 (2 5 per cent) in both the cerebellum and cerebrum

High mortality from cerebellar abscess In spite of the general belief the percentage of recoveries following the evacuation of cerebellar abscess is still very low although individual operators report a fair percentage Niehsmann (16) in a large collection of reported cases found only 10 5 per cent recoveries in contradistinction to the much lower mortality of adjacent tempero-sphenoidal lobe abscess in which the recoveries are from 35 to 50 per cent and in the hand of William McEwen 80 per cent Niehsmann (16) reports 8 cases of cerebellar abscess with no recoveries and Boot (1) reports 5 cases of this type of abscess with one recovery

The discouraging results of operative treatment are largely due I believe to the surgeon's uncertainty regarding the presence of a cerebellar abscess during the period in which operative interference is most favorable that is during the latent stage after the development of a capsule but before the onset of [illegible] of central compression as well as to the impossibility of localizing the abscess [illegible] considerable damage to [illegible] To this must be added [illegible] explorations have failed [illegible] which latter has occasioned [illegible] among surgeons

With the object [illegible] of cerebellar abscess [illegible] exploration and [illegible] abscess in the [illegible] literature of [illegible] been attempted

Surgical and [illegible] mortem reports [illegible] *abscess* In [illegible] cases the [illegible] defined to [illegible]

TABLE I

RECOGNIZED SITUATIONS OF CEREBELLAR ABSCESS IN RELATION TO THE USUAL ROUTES OF OPERATIVE APPROACH

Situation of abscess in cerebellum in 131 autopsy records in which the position of the abscess is stated with sufficient definiteness to justify analysis

		Cases	Per cent
A	Total number which would probably have been accessible to exploration from front of sinus	41	44
1	On or near anterior surface of cerebellum	30	
2	Whole of lateral hemisphere	11	
B	Total number probably accessible to exploration if approached from behind sinus	24	26
3	In posterior two-thirds of cerebellum	23	
4	On lateral surface of cerebellum	1	
C	Total number probably inaccessible by either route of exploration	11	12
5	On or near lower surface	6	
6	On or near lower and mesial surface	3	
7	On or near posterior and mesial surface	1	
8	On or near upper surface	1	
D	Total number positively unlocalizable by either route of exploration	17	18
9	In middle lobe	3	
10	Opposite lobe	2	
11	Bilateral	2	
12	Multiple abscesses	10	
	Total	93	100

The situation of the abscess would have allowed evacuation and drainage from in front of the sinus in 41 cases (44 per cent) while such a method of approach would probably have failed to reveal pus in 52 (56 per cent) Punctures behind the sinus probably would have revealed pus in 24 (26 per cent) but even if thus successfully located imperfect evacuation would surely have followed such an approach so that even were the surgeon enabled to diagnose the position of the abscess by a careful study of the mode of invasion he could approach the abscess at its nearest point to the dura in but 70 per cent of the cases if the technique were limited to the present accepted method of approach while of these in only 44 per cent of the total would the position of the dural opening have allowed proper evacuation and drainage Of the remaining 56 per cent the described situation warrants the belief that the position in the posterior two-thirds of the cerebellar hemisphere would have rendered extremely improbable the location of the abscess even by repeated punctures from in front of the sinus in 23 (25 per cent) Twenty eight or 30 per cent probably could not have been located by either method The position in these 28 cases on the lower mesial upper or lateral surfaces or opposite lobe would almost surely have precluded the possibility of the abscess having been reached by either approach in 17 cases (about 18 per cent) and the position and type of the other cerebellar abscesses positively precluded successful intervention by either method in 12 (about 13 per cent) 10 were multiple and 2 bilateral.

On the other hand the described situation warrants the belief that 81 of the 93 cases (over 87 per cent) were amenable at least theoretically to localization and complete evacuation had a method of exploration been adopted allowing a dural incision of sufficient size for complete inspection and exploration of the cerebellum

In these 87 per cent possibly successful cases if the operative attack is to conform to the accepted conditions necessary for successful surgical intervention viz that the exploration evacuation eradication and drainage should follow the original tract of infection and enter the abscess at its nearest approach to the dura 41 (about 51 per cent) of them should have been evacuated at some point on the anterior surface of the cerebellum 35 (about 43 per cent) at some point behind the lateral sinus 5 (about 6 per cent) from beyond the median line or the opposite cerebellar hemisphere

Bourgeois (4) collected from the literature the reported cases of cerebellar abscess and analyzed the position of 63 of them as follows

	Cases	Per centage
Anterior (by which term he designates those situated in the anterior part of cerebellar fossa in relation with the posterior surface of the petrous bone)	15	4
Anterior external (in juxtaposition with the sinus)	27	43
Anterior external (in relation to the internal auditory meatus)		16
Posterior external (posterior to the sinus)	4	6
In the sinus	6	9½
In the flocculus		½
	63	100

Description not precise enough for analysis 2

1 *Increased intracranial pressure* In cerebellar abscess the intracranial pressure is generally increased This increased pressure is the result of the increase in the cerebellar contents from (a) the abscess itself and from the displacement of affected lobe beyond the median line into the

cerebellar fossa of the opposite side blocking the normal cerebrospinal fluid pathway thus giving rise to (b) an obstructive hydrocephalus The hydrocephalus is further aggravated by an increased secretion of cerebrospinal fluid from irritation of the inflammatory process Personal experience and experimental evidence show that cerebellar abscess because of its suppurative nature is always accompanied by internal hydrocephalus of variable degrees independent of any obstruction of the ater However an examination of the autopsy reports previously referred to record only 28 instances of enlarged ventricles in 128 cases of cerebellar abscess

Surgical importance of not suddenly disturbing the abnormally placed cerebellar tissue The intracranial pressure of the posterior fossa is normally maintained by the cerebrospinal fluid circulatory system which also is the chief agent in protecting the vital centers of the medulla from injury by the surrounding bony wall of the foramen magnum especially when the medulla is herniated downward through the foramen Normally impact of the medulla on this bony ring is prevented by the cerebrospinal fluid in the cisterna pontis in front the cisterna magna behind and laterally by the cerebellar tonsils on the inferior surface of the cerebellum which latter project through the foramen magnum for variable distances in some cadavers reaching only to the upper border of the posterior arch of the atlas and in others to the upper border of the lamina of the axis (Moore 12) The fluid in the basal cisterna acts as a water bed for the brain lifting the brain stem and cerebellum upward The direction of the maximum intra-cerebellar pressure is normally backward upward and outward in the axis of the lateral lobes of the cerebellum toward the tegmen cerebelli away from the median line and the posterior surface of the petrous pyramid to which the cerebellar surface is more or less fixed by nerves or vessels entering the internal auditory meatus and the venous sinuses It is because of this fixation that incision of the dura on the anterior surface of the cerebellum (behind the posterior surface of the petrous pyramid and internal to the sinus) is usually attended by little herniation On the other hand incision of the dura external to the sinus over the lateral lobe is generally associated with uncontrollable herniation which prevents proper inspection at operation and subsequent drainage

2 *Cerebral displacement* In addition to the increased pressure the enlarged size of the affected cerebellar hemisphere displaces the vermis pons and medulla which normally occupy the median position of the posterior fossa crowding them laterally beyond the median line and downward into the foramen magnum The displacement alters in a fundamental way the normal circulatory mechanism which is necessary for the proper functional activity of the cerebellum and the brain stem (7 2)

In cerebellar abscess both the increased intracranial pressure and the brain stem displacement is generally tolerated chiefly because the displacement is of gradual development permitting the stretching of the fixed parts of the brain the vessels and the nerves If however the resistance to further herniation of the medulla into the foramen magnum is suddenly removed sudden death from pressure upon the vital centers may follow Or what is probably more frequent when the increased pressure plus the brain stem displacement causes a sudden and severe circulatory disturbance of the vital centers with rupture of the stretched vessels embarrassment of the respiration results followed at a longer or shorter period by death I believe that it is the circulatory disturbance and not the foraminal herniation which is probably the most frequent cause of respiratory paralysis Bornes (2) collects 47 cases of respiratory paralysis in brain abscess (32 cerebellar) and comes to the conclusion that respiratory paralysis is the result of a combination of increased intracranial pressure and circulatory disturbances from abnormal cerebral displacement

I have seen four sudden fatal respiratory paralyses in brain abscess (two cerebellar one in the occipital lobe and one in the tempero sphenoidal lobe) Small punctuate hæmorrhages into the pons and medulla were noted at autopsy in one of the cerebellar cases No especial importance was attributed to these hæmorrhages until later when a similar autopsy finding was made in two cases of cerebral tumors These patients had died suddenly In both a lumbar puncture had been performed and in one an operation had preceded lumbar puncture In one the autopsy report reads *Hæmorrhages in the parenchyma of the pons* where there are numerous transverse streaks of clotted blood which were being compressed by the transverse fibers of the pons There is also slight piarachnoid hæmorrhage about the course of both superior cerebellar arteries These hæmorrhages were probably terminal due to rupture of the transverse branches of the basilar artery possibly from sudden disturbance of the intracranial pressure by the lumbar puncture (Harrison Martland personal communication)



Fig. 1.—Petechiæ hæmorrhages and lesions of the pons at the point of sudden flattening in the position of the brain stem from displacement by a tentorial cerebellar cavernous angioma of cerebellar displacement of the pons by a phenoidal lobe tumor. (Autopsy and photograph by Dr. Fred Sutton.)

In case of a tempero phenoidal lobe tumor in which a lumbar puncture was performed the autopsy revealed multiple hæmorrhages in the pons (Fig. 1).

Because of the brain stem's displacement and the associated liability of respiratory paralysis from ventricular puncture (or a lumbar puncture) should never be performed in cerebellar abscess not at least unless the surgeon is prepared to evacuate the abscess immediately or to freely incise the dura as any sudden alteration in the position of the displaced brain stem may cause rupture of the stretched vessels and sudden death.

The disturbance of the already overtaxed central control of the circulatory system is the cause of the cessation of respiration when ether is being administered which has resulted fatally in numerous instances. The immediate cessation of respiration on the administration of ether in a recent fatal case has persuaded me that a suspected cerebellar abscess with known increased intracranial pressure should be operated upon under local anæsthesia whenever possible at least until the dura is freely exposed. In several cases in which all other means had failed respiration was restored by the immediate evacuation of the abscess (3, 14). Borries (3) collected 4 new cases in which immediate evacuation of the abscess was followed by resumption of respiration.

Technical surgical requirements in exploration for cerebellar abscess in the anterior surgical triangle.—Both physiological and mechanical factors and clinical experience demand that the exploration of a cerebellar abscess originating from infection of the petrous pyramid should be through a dural opening situated as far forward as possible in order (a) to follow the route of infection and (b) to lessen the cerebral herniation. Accepted surgical principles also require that the dural opening be large enough to permit of (c) adequate inspection and evacuation and that the operative procedure be performed (d) through a clean field otherwise an unsuccessful exploration may result in a fatal suppurative meningitis. In addition the inspection and evacuation must be conducted so that (e) no further disturbance is transmitted to the already displaced and functionally endangered brain stem.

The disadvantages of the usual methods of operative treatment when the abscess is probably situated in the anterior cerebellar triangle are as follows when

1. *Incision and evacuation is in front of the lateral sinus.*

Even when an abscess has been located the dural surface which can be obtained is too small to permit complete eradication by cleansing under inspection or subsequent adequate drainage and as a large proportion of cerebellar abscesses have fingerlike prolongations this method should not, in my opinion, be employed although probably the largest number of successes have resulted from this procedure. Mouret and Cazejust (15)[1]



Fig. 2.—Sketch showing relation of sinus and cavity of descending portion of lateral sinus with two dural attachments projected on bone. (From Wm. MacEwen's *Atlas of Head Surgery*, Plate 41, Horizontal section through bone and middle fossa of auditory meatus and dipsing through the meatus and post.)



Fig. 3.—Sketch showing pear-shaped form of cavity of transverse sinus with the line of two fissures with three fixed dural surfaces for tying blood at base. (From Wm. MacEwen's *Atlas of Head Surgery*, Plate 4. Cerebellum. Horizontal section through the meatus and post. to ur. l. b. egmati. l.)

The difficulty of proper exploration through evacuation or adequate drainage (because of the smallness of the area between the sinus and the posterior pyramid) has been successfully overcome in a few cases by

2 *Destruction of the labyrinth is followed by exploration of the cerebellum in front of the sinus* My personal experience and an examination of the literature reveal however that an anterior approach even with the destruction of the labyrinth has frequently failed to locate the abscess although one of considerable size existed (18)

However if the whole of the cerebellar fossa is exposed and the dura freely incised all parts of the cerebellum may be inspected and the abscess localized and thoroughly evacuated

3 *When the labyrinth had been destroyed Bourguet (5) enlarged the anterior homolateral area by a double closely applied encircling ligation of the sinus with entrance to the cerebellum by the sinus between the ligatures and through the sinus walls*

All these methods however fail to fulfill the surgical requirements of a clean operative approach as the cerebellum is entered through an infected area In the operative treatment of cerebellar abscess of the anterior surgical triangle the method of Bourguet is undoubtedly the most important addition of recent years but is attended by the following objections

1 A double ligation of the sinus (except very low in the descending portion) is attended with great technical difficulties (Figs 2 3) especially if the sinus is large or has abnormally communicating sinuses as is frequently the case (19 20)

2 This operation is conducted through an infected area

As a logical development of Bourguet's method of double ligation and in an attempt to overcome the technical difficulties of a sinus ligation while keeping within an area as yet not infected I have practiced and advocate the following beginning the operation by uncovering the dura over both cerebellar hemispheres followed by an *exposure of a lateral sinus* of the affected side A clean area is obtained by *approaching the sinus from behind* after which the sinus is *obliterated by the incision* of its outer wall into its cavity just below the knee and by an encircling ligature in its lower portion This procedure will admit of a *free incision of the dura through the walls of the sinus with enlargement anteriorly or posteriorly into the continuous dura surface and this in many cases in an uninfected area*

My experience with this method is still too limited to warrant the statement that the mortality from cerebellar abscess will be improved by its adoption but theoretical consideration and the high mortality by other methods certainly justify its trial in suspected cerebellar abscess especially during the latent period when a positive diagnosis of cerebellar abscess is impossible and when consequently exploration by the recognized methods may not be warranted because of the risk of infection of the meninges

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A NEW SUPRAPUBIC PROSTATIC ELEVATOR

By ROBERT EMMETT FARR M D F A C S *Minneapolis Minnesota*

THE trend of modern surgery is toward a better exposure of pathology during operation The classical method of performing suprapubic prostatectomy through a small incision while supporting the gland from below by one or more fingers in the rectum is seen less and less Many surgeons now perform suprapubic prostatectomy without the aid of the rectal finger thus greatly simplifying the maintenance of an aseptic technique A realization of the virtues possessed by a perfect visualization of the interior of the bladder is gradually preading throughout the surgical world and the urologist is adopting this principle to some degree

The more extended use of local anæsthesia has had a marked effect in this regard The advantages of adequate incision and exposure of the *interior of the bladder transfixion and elevation* of the enlarged gland permitting of enucleation similar to that employed in dissections of the neck for the removal of tuberculous glands or thyroid adenomata should be obvious to everyone We have taken advantage of this principle in all of our bladder work during the past 10 years

The employment of a preliminary sacral anæsthesia combined with a complete infiltration block of the suprapubic field tilting of the operating table elastic retraction of the edges of the incision and perfect illumination of the relaxed air distended bladder offer to the surgeon the same opportunity for work upon the interior of the bladder as that presented by the fresh cadaver Trauma may thus be minimized and hæmorrhage may be prevented by the application of surgical principles as all structures are brought directly within the field of vision

In SURGERY GYNECOLOGY AND OBSTETRICS November 1920 the writer described a prostatic elevator designed for the purpose of facilitating

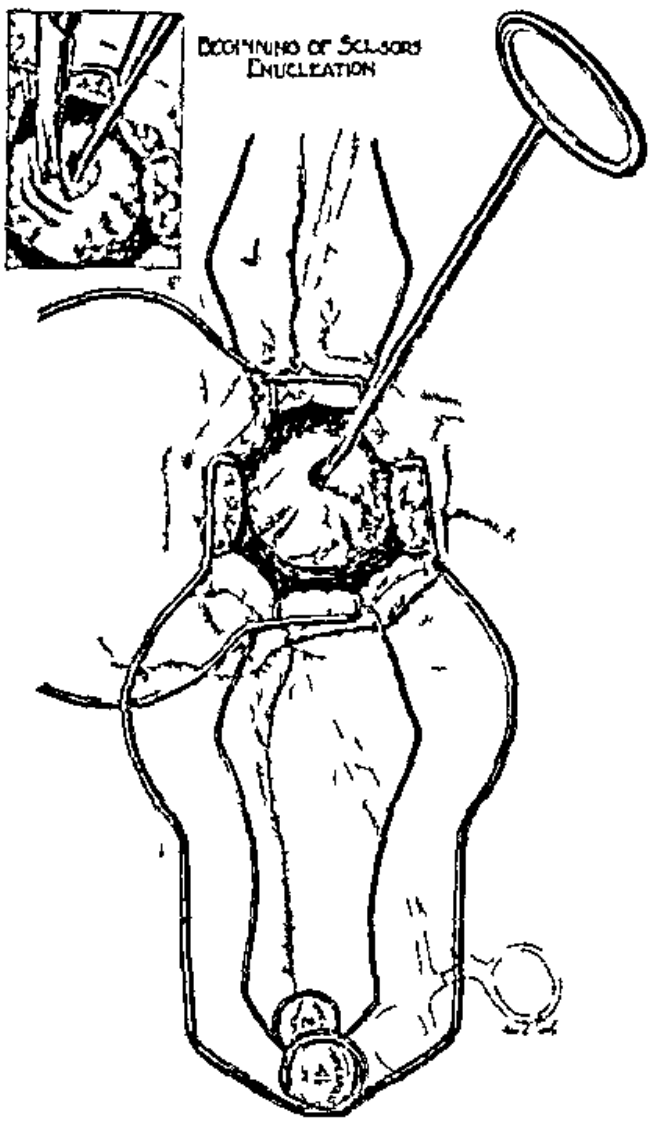


Fig S prap bic pro t tectomy—prost t c ele at r in actio —surf c vie

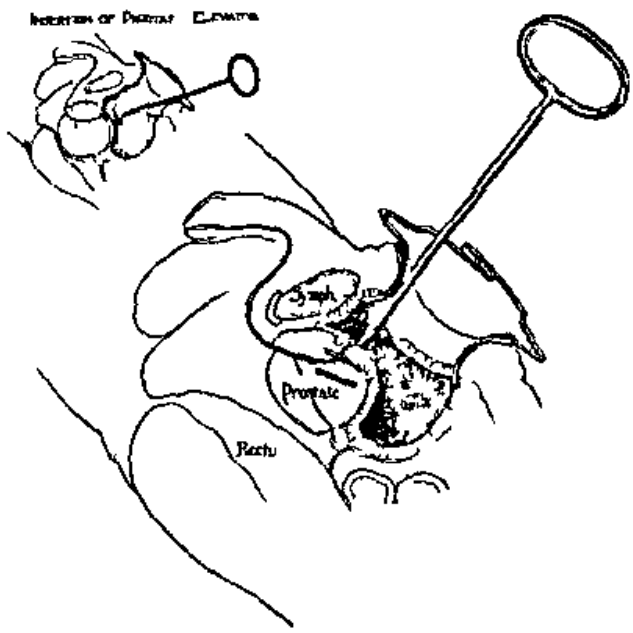


Fig Sup p bic pr tatectomy—p ostati ele ator t o —sagittal iew

the removal of the prostate through the supra pubic incision While this instrument has proven a most valuable aid and has more than fulfilled the writer s expectations it is difficult to manufac ture therefore expensive and there is in the case of small prostates the possibility of the finger coming in contact with one of its points during the process of enucleation

The instrument herein described presents all of the advantages and none of the disadvantages of the previous one It is inexpensive and extremely efficient Its shaft is small therefore giving the minimum obstruction to one s vision When in troduced into the gland it brings the latter abso lutely under the surgeon s control it interferes in no way with finger enucleation and like the pre viously described instrument effectually obviates the necessity of inserting the finger into the rec tum

The point of the screw (insert Fig 1) is in troduced into the posterior wall of the prostatic urethra and the instrument screwed boldly into the gland the dimensions of which have been previously estimated until its shaft only presents The direction in which the screw is introduced being at an acute angle with the prostatic urethra brings its distal portion well posterior (Fig 1) One may now enucleate the gland under direct vision and as a rule the use of curved sci sors or a curved hook will almost do away with the ne ce sity of introducing the hand into the bladder (Fig 2)

AN ILLUMINATING DEVICE FOR THE VAGINAL SPECULUM[1]

By MORTIMER N HYAMS M D New York
In tru to D partm t f Gy ec l gy N w Y k P t G d M d l S hool d H sp l

THE instrument described and illustrated herewith is designed for illuminating the vag inal canal fornices cervix etc by means of an efficient direct stationary illumination suitable and available for examination treatment and operative procedures

Heretofore direct vision was obtained by means of a head mirror or a self made contrivance such as a flexible stationary lamp necessitating adjustment at each examination to the needs of the individual patient and the requirements of the occasion These invariably have proven unsatis factory particularly in the complete examination of the vaginal canal etc for not infrequently important details would be overlooked particu larly in the examinations made at the patient s home where the surgeon is constantly laboring under a marked disadvantage

It is generally conceded that the essential req uisites for direct illumination are the following (1) adequate illumination (2) the light away from contamination by secretions (3) non interference with the lumen of the speculum Obviously these requisites have not been attained by illuminated specula heretofore employed

The instrument now presented in addition to overcoming all the difficulties previou ly en countered successfully accomplishes each of the foregoing requi ites It provides abundant il lumination for visual examination treatment and operation Thus effective illumination is assured regardless of the position size or shape of the patient and without the inconvenience and an noyance of repeated continuous and awkward changes of the direction of the rays of light Its design and construction insures against the con tact of the light with the secretions and prevents encroachment upon the lumen of the peculum

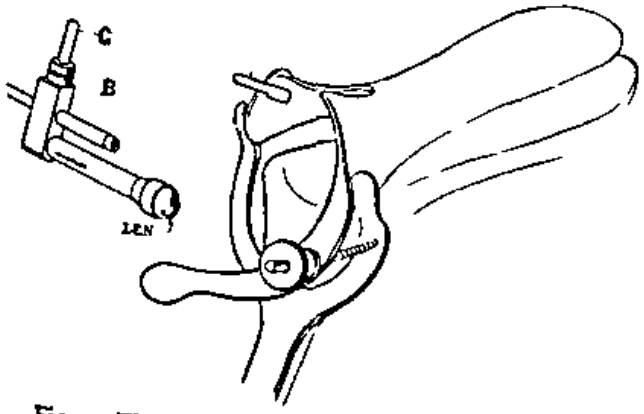


Fig 1 Ill m at ng d e ho g l s t el *B* f r attachm nt to pin *A* n pe ul m *C* C n t nf l ght
Fig 2 V ginal pecul m with pi t f the tt hm nt of th llumin t ng de c

Desc iption The ordinary bivalve speculum is used To this is fitted a mall circular pin *A* placed on a line with the long axis of the speculum Thi attachment is fixed to the upper movable lip

From h D partme f Gynec logy New Y k Pos Gradua Med al School d Hospital New Y k

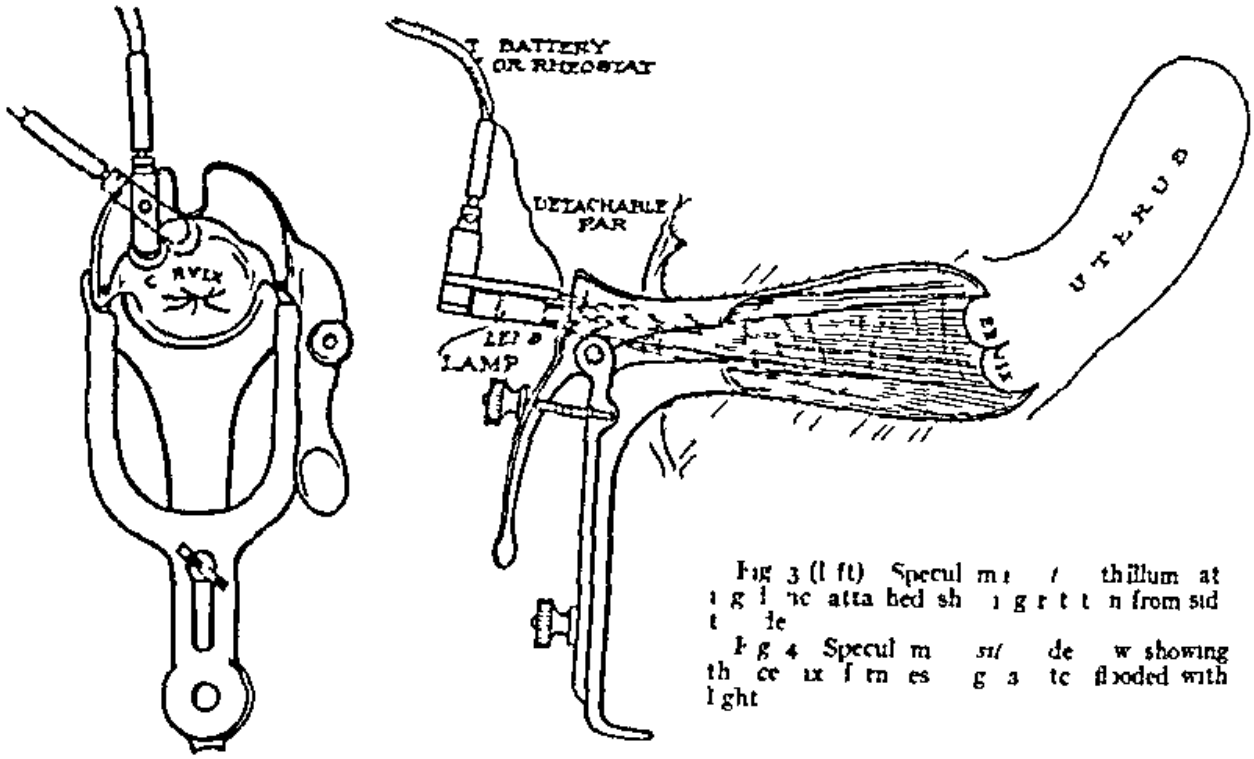


Fig 3 (left) Speculum with illuminating attachment shown from side to side

Fig 4 Speculum seen from above showing the cervix and vaginal canal flooded with light

one half inch to the left of the median line and does not interfere with the original space left for the clitoris

One of the essential features of this instrument is the light carrier having a focusing lens so adjusted as to concentrate the rays of light on the cervix and abundantly illuminate the entire vaginal canal The tunnel *B* of the carrier fits on the pin 1 thus making a swivel connection for rotation of the light from side to side The entire attachment *projects less than one half inch from the anterior* lip and in no way interferes with the lumen of the speculum It is a detachable unit easily removed when not in use thereby permitting of its interchangeability with many instruments This assures and facilitates thorough sterilization The coupling of the cord from the source of current points to the abdomen away from any vaginal secretion or contamination

The cord and rheostat or batteries are stock types supplied *by manufacturers and constitute a* part of the equipment of practically every physician and surgeon The source of current may be through a rheostat portable batteries or even a small hand battery ordinarily used with eye or ear instruments

Method of procedure 1 The speculum is inserted and left loose

2 The cord is attached to the light and the proper degree of illumination obtained by increasing or decreasing the amount of current through the rheostat or batteries

3 The light is then attached by means of the tunnel *B* to the pin 1 attached to the left side of the anterior lip of the speculum

4 The speculum is then rotated and by this direct illumination adjustment is facilitated

5 Thus the treatment examination or such procedure as may be indicated is carried on under a constant illumination without need of changing the position of the source of light

6 With the completion of the treatment etc *the light is detached from the speculum the latter* removed from the patient and is ready for sterilization The light carrier may be attached to successive specula without interruption

Accomplishments 1 The vaginal canal is flooded throughout with a constant continuous and direct illumination at all times

2 The lumen of the speculum is unobstructed by the light attachment

3 One light unit being interchangeable with *many instruments a sterile vaginal speculum* is always available

4 The source of light is far enough away from the field to prevent contamination from secretions but insures abundance of illumination

5 The entire instrument is negligible in bulk and weight and obviously convenient for satisfactorily examining patients at their homes or places other than the surgeon's office

6 Attachments are stock accessories readily obtainable and ordinarily applicable to any type of vaginal speculum

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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NOVEMBER 1924

SURGERY IN CHRONIC ULCER OF THE STOMACH AND DUODENUM

IN recent surgical literature much attention has been given to chronic ulcer of the stomach and duodenum There has been a tendency in some quarters to advocate resection of ulcers of the duodenum which were formerly treated and very successfully by gastro enterostomy Many years have been devoted to perfecting the technique of gastro enterostomy which in the hands of experts at the present is practically without danger Careful delicate handling avoidance of tension the short loop and proper arrangement of the size and position of the opening have brought this operation to such perfection that hæmorrhage has almost been eliminated the formerly dreaded vicious circle is no longer to be feared and the operation in experienced hands is both simple and safe It changes the chemistry of the stomach contents diminishing acidity The larger and more inflamed a duodenal ulcer is the better the patients do They increase in weight during their stay in the hospital the clinical picture is changed for the better and according to the latest statistics (Mayo) about ninety per cent are permanently relieved On the duodenal side of the pylorus we are free from danger of cancer Gastro enterostomy is a far less serious and difficult operation than most resections Why then substitute the more dangerous for the simpler procedure?

Safety First is as good a slogan in the abdomen as on the highway It is nevertheless true that when the ulcer is characterized by serious or repeated hæmorrhage resection may be necessary and when the parts are movable and can be drawn well out should be seriously considered for it is not unknown for hæmorrhage from an ulcer to continue after a gastro enterostomy and a resection of course deals directly with and removes the bleeding surface Where the ulcer is extensive and runs well down on to the duodenum however it may be difficult because of the depth to which the dissection may have to be carried the amount of inflammatory thickening and adhesions and the consequent difficulty of closing the duodenal stump Whosoever resects under these circumstances takes a serious risk In several instances the writer has seen resections of the pylorus undertaken in cases in which it seemed to him that gastro enterostomy would have cured the ulcer but because the pylorus was movable and the ulcer small a resection was undertaken and skilfully performed but the patients died It is a very unpleasant experience to lose a patient from doing more than you feel may have been necessary and the possibility of a secondary resection which might have been done if the patient was not cured also makes radical procedures at first less imperative

The walls of the stomach are so thick it is

often so easy to handle and so well adapted to hold stitches that we are tempted to do too much With ulcers on the gastric side of the pylorus if close to it and causing obstruction my own results as to cure by gastro-enterostomy have been most favorable Resection may be performed here on account of the danger of cancer which from the statistics of one large clinic seems to be great However I do not believe it great enough to justify taking large risks in the ulcers close to the pylorus

He advocates by von Haberer of extensive resection followed by gastro-duodenal anastomosis it seems to me has done a good deal of harm That the pylorectomy of Finney which he has always advocated stops short of gastro-enterostomy has not in all cases been entirely satisfactory is brought out by the fact that he now advocates a method of excision by which the cut end of the stomach is attached to the side of the occluded duodenum the end of which has been closed by a purse string suture Would one care to be subjected to this procedure even in skilful hands for the cure of a small ulcer of the duodenum? C H Mayo has recently described what seems a very satisfactory method of resection in smaller ulcers of the duodenum but as I understand it limits its application to cases in which hæmorrhage is present

The case of large ulcers of the lesser curvature is different both on account of the lesser probability of cure by gastro-enterostomy and the definite danger of cancer Here resection in some form is of course necessary and here the cautery operation of Balfour combined with gastro-enterostomy has greatly reduced what used to be a high mortality These cases require the greatest skill and judgment and in my opinion should be referred by the average so-called abdominal surgeon to those men who have demonstrated special skill in this field Only special skill and experience can teach what is safe and efficient What is safe in skilled hands is dangerous for men not specially qualified The very best proverb in this connection is the old Greek adage which among others was inscribed for guidance of the multitude over the entrance to the Temple of Apollo at Delphi μηδὲν ἄγαν which may be interpreted Never attempt what is beyond your capacity Never do not bite off more than you can chew F B Lund

SYSTEMATIZED OPERATING ROOM ASSISTANCE

In visiting a large number of surgical clinics in America and in foreign countries the activity of the internes who serve as operating room assistants has furnished material for interesting observation I have found that in some clinics the young men give intelligent and really valuable service in other clinics they are of little or no use while in still another group of clinics the internes are a liability rather than an asset

I have made the further observation that internes with the same training men who have been classmates in the same medical school and who later serve in different surgical clinics may render excellent service in one clinic while in another clinic the service may be quite inferior

I believe that the difficulty does not lie in the character habits intelligence or qualifications of the internes but in the interest which the surgical head of the clinic takes in his internes and especially in the ability of the chief not only to develop a definite system with which the internes can become familiar but also to adhere willingly to carefully planned methods combined with a plan of regular conferences

In my clinic the essential principles have been formulated in a concise set of rules which I discuss with the entire staff of internes at regular intervals at our weekly conferences and always at the first conference after the admission of a new member of the interne staff

Nothing seems more valuable in developing an efficient interne staff than weekly conferences and adherence to a definite system of work

The following rules have been in use for many years in my clinic at the Augustana Hospital

1 Concentrate your attention upon the operation to facilitate work and eliminate infection

2 Waste not a moment's time from beginning of anæsthesia until the patient is returned to bed

3 Bear in mind the patient's condition before during and after operation

4 Anticipate the steps of operation throughout operation Determine reason for each step

5 Constantly avoid traumatizing the tissues

6 Touch tissue with instruments not with hands

7 Apply forceps without jamming tissues or pulling upon them

8 Retract tissues gently not violently Guard against slipping of retractors

9 Press gauze sponges against bleeding surfaces Do not rub them

10 Handle only the instruments you apply personally Do not hand them to others

11 Never pull sutures tightly enough to cause pressure necrosis

12 Place needle at right angle to wound grasping the same amount of tissue on both sides

13 Work accurately but rapidly Waste no time

14 Use the same care against infection in dressing wounds as in the actual operation

15 Use the same care against infection in re dressing wounds as in the actual operation

16 Do not manipulate or press wounds during dressing

17 Develop an antiseptic conscience which you carry with you all the time

18 Develop an anti waste conscience which you carry with you all the time

19 Teach younger assistants and nurses to avoid waste of every kind

20 Do not let patients wait in the halls before anæsthetic is begun

21 Plan tomorrow's operations carrying all details in your mind

22 Have a clear idea of the history diagnosis proposed treatment and pathology in each case

23 Take a personal interest in each individual patient from the time of admission to the time of discharge

24 Observe carefully any error in anything connected with treatment or organization and report at conference

25 Follow the standardized plan of work being however constantly alert to discover improvement in technique or plan of work Do not introduce new technique until it has been carefully thought out by you and considered in conference A J Ochsner

MASTER SURGEONS OF AMERICA

SAMUEL PRESTON MOORE

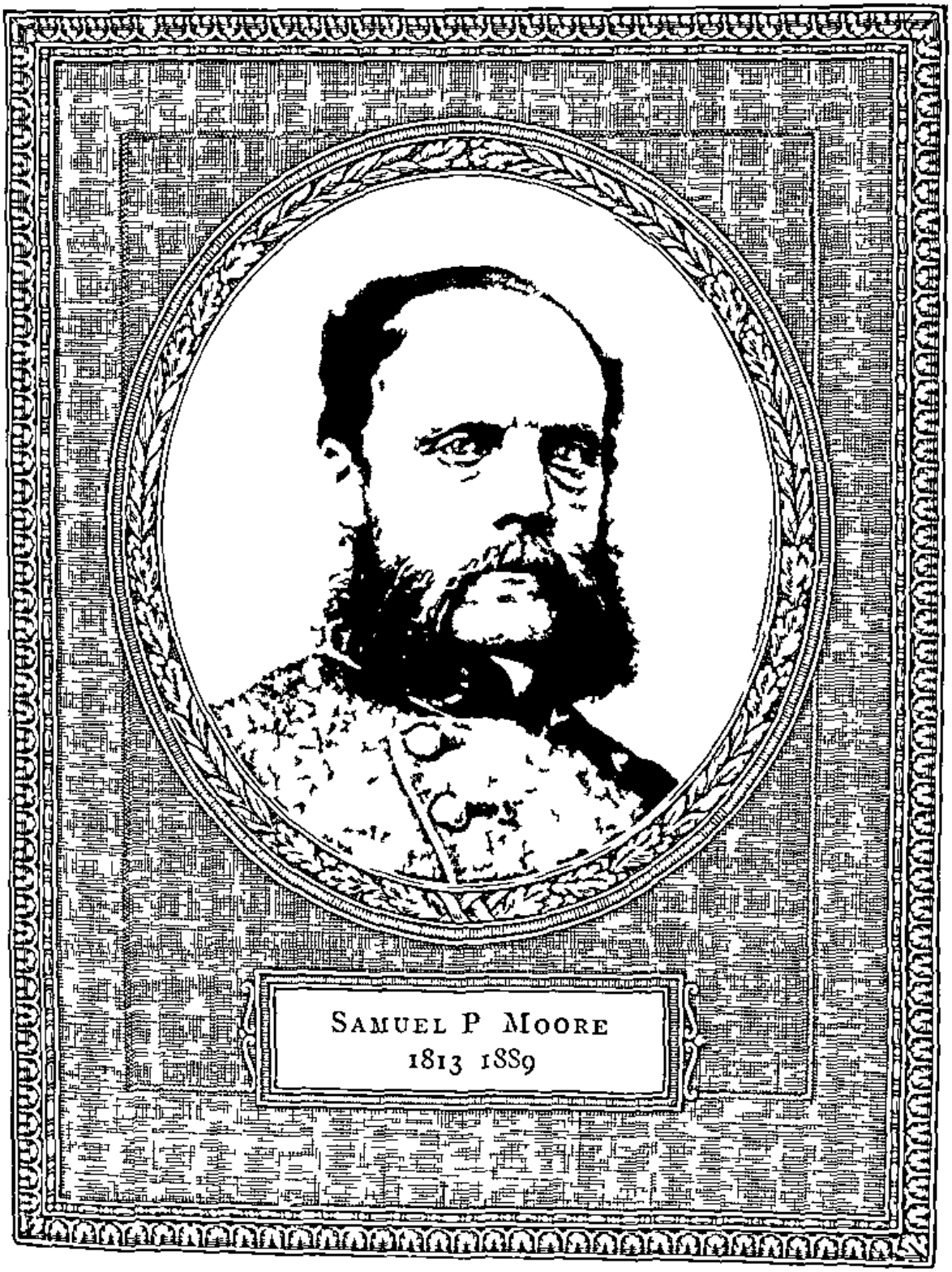
SAMUEL PRESTON MOORE was born in Charleston South Carolina in 1813 His father and mother were Stephen West and Eleanor Screven (Gilbert) Moore His grandfather and grandmother were Samuel Preston and Susanna (Pearson) Moore His first American paternal forebear was Dr Mordecai Moore the physician of Lord Baltimore the founder of Maryland

Dr Moore was educated in the city of his nativity Graduating in medicine in 1834 he was appointed assistant surgeon (with the rank of captain) in the United States army March 14 1835 when he was twenty two years of age His service in the old army lasting for 26 years was a very varied one and prepared him well for the execution of the onerous and most responsible duties to which he was called when in 1861 he threw in his lot with his fellow citizens of South Carolina

On July 30 1861 Dr Moore was assigned to duty in Richmond as acting surgeon general of the Confederacy and his name was on November 29 1861 presented to the Provisional Congress of the Confederate States for confirmation

Probably the most difficult work that he had at the start was to secure a sufficient number of competent surgeons The troops in the field were all volunteer troops who had been allowed to select their own officers medical officers included and their selections were not always the best In the enthusiasm of the early days of the war many doctors had volunteered for service as soldiers not as surgeons Some of these were officers and some even in the ranks Proper laws applying to the medical personnel were slow in getting passed But in course of time medical examining boards were provided for which improved conditions wonderfully It is estimated that there were first and last about one thousand surgeons and two thou and assi tant surgeons in the Confederate army and navy—both branches of the service being looked after by the one medical department

These cared for in the 4 years of the war six hundred thousand Confederate troops and about two hundred and seventy thou and Federal prisoners of war the latter of whom had to be looked after for a much longer period than normally would have been the case because of the stern policy of the Federal government



SAMUEL P MOORE
1813 1889

late in the war of permitting no exchange of prisoners a policy that resulted in the crowding at one time of thirty thousand prisoners into a space at Andersonville intended to accommodate only ten thousand and in a distressing death rate in most of the Confederate prisons—but one not equal it must be said in justice to the Confederate surgeons and their chief who strove manfully to reduce it to the death rate in the Federal prisons the percentage of deaths in the former being about 8 3 and in the latter 12 It is said that the Confederate surgeons cared for during the war more than three million cases of wounds and disease

Moore s next most difficult work was the erection of an adequate number of hospitals in properly selected places throughout the South—such hospitals as in the late great World War would have been called base hospitals

A continuing and increasing difficulty was the securing of medical and surgical supplies for these base ho pitals and for field and camp Though the Federal blockade pressed heavily the medical department of the Confederacy did not cease at any time during the war from getting in large quantities of supplies from abroad In addition there was a good amount of trade with Mexico and there was always a vast amount of smuggling along the extended borders of the North and the South Another source of supply was capture The result of all this was that there was at no time an ab olute dearth of medical supplies Many Confederate surgeons said after the war that they never failed to have an ample supply of the three most important drugs quinine morphine and chloroform

From the beginning of the war Dr Moore occupied himself with the question of substitutes and with the study of the medicinal qualities of indigenous plants A rather amusing correspondence is preserved—and printed in the Records — carried on between Surgeon General Moore and one of the generals in the field in reference to the use of quinine he maintaining that the general had erred in issuing an order that quinine should be given to the troops as a prophylactic He held that it should be reserved for use in cases of actual sickness and that a preparation of native plants should be relied on for prophylactic purposes His standby was the following Dried dogwood bark 30 parts dried poplar bark 30 parts dried willow bark 40 parts whiskey 45 per cent strength 2 pounds of the mixed bark to 1 gallon of whiskey Mascerate 14 days Dose for tonic and anti febrifuge purposes 1 ounce three times a day

As with medicines so with hospital furniture bedding and other necessary articles it was in course of time found necessary for the medical bureau to assume direct control of the manufacture of them Competent operatives had to be secured for the work Disabled soldiers were used as far as practicable but what with his laboratories his distilleries and his establishments for making equip ment he had to have detailed many men experts in their line whom command ing officers were loath to give up and anxious to get back into ranks The surgeon general was compelled to wage a constant warfare to keep up his organi

zation What he was striving for until the very end was permanence of assign ment of men to the work under his control and their exemption from all military duty He maintained that they should not be expected to bear arms *even in* extreme emergency

Dr Porcher says of him in an address before the Association of the Sur vivors of the Confederate Surgeons of South Carolina at Columbia South Carolina November 1889

Within his domain which was a very extensive one he had absolute power and the *fiat* of an autocrat, the Emperor of the Russias was not more autocratic He commanded and it was done He stood *in terrorem* over the surgeon what ever his rank or wherever he might be—from Richmond to the trans Mississippi and to the extremest verge of the Confederate States And though appearing to be cold and forbidding we do not think that Surgeon Moore was cruel arbi trary *or insensible to conviction We have ourselves experienced some of his* stern rulings which were afterwards fully compensated for'

One respect in which the surgeon general in Dr Porcher s opinion erred was in his opposition to the granting of furloughs except in extreme cases Dr Porcher maintained that the mental outlook of the average Confederate soldier was different from that of the average soldier in any other army that the Con federate soldier was when depleted by wounds or sickness peculiarly subject to an extreme degree of nostalgia that became dangerous in its effects The promise of a furlough was found to be superior to the whole pharmacopœa and would literally rescue a sick or wounded soldier from the jaws of death This peculiarity of the Southern soldier may in some measure account for the higher mortality in th Northern prisons than in the Southern prisons Moore accus tomed in the old United States army to men on the average much less sensitive and high strung than were the Confederate soldiers was a foe to easy furlough

Dr Moore did not overlook the value of the meeting from time to time of men of the same profession for the discussion of topics of mutual interest and for gaining inspiration from contact with each other In August 1863 there assembled in Richmond under his auspices a large number of surgeons who organized the Association of Army and Navy Surgeons of the Confederate States He also endeavored to have supplied in a measure the lack of profes- sional literature throughout the South by encouraging the publication of *The Confederate States Medical and Naval Journal* This came out monthly in Rich mond from January 1864 through February 1865 In short he seems to have neglected none of the known methods for consolidating the members of the medical and surgical profession in the South in his effort to make of them a most efficient instrument in the conduct of the war

The last report made by Surgeon General Moore to the Secretary of War is dated February 9 1865 It is a special report in reply to a circular sent out by

the Secretary asking for a report from each department head as to the means on hand for carrying on the war It was generally felt that conditions were becoming critical One would not suppose this however from a perusal of the reports which if not optimistic are certainly determined Dr Moore replied in part The department has on hand of some articles a twelve months supply of others a limited supply but if allowed to retain its skilled employees at the various laboratories purveying depots and distilleries and to import medicines freely through our lines in Mississippi and Alabama no fear need be entertained that the sick and the wounded of the army will suffer for the want of any of the essential articles of the supply table

At the close of the war Dr Moore elected to remain a resident of Richmond Since he had sufficient means to supply the wants of himself and family he did not endeavor to practice his profession to any great extent preferring after the arduous labors he had performed to pass the remainder of his life in comparative ease Being however a very public spirited citizen he served his adopted city and State well as a member of at least two boards One of these was the executive board of the Virginia Agricultural Society of which he became a member in 1874 continuing until 1881 Since he always took his duties seriously his services in connection with the State fairs were valuable His was a striking figure in the crowds at the exhibition

His services were even more valuable as a member of the city school board from 1877 until his death It is said of him that every morning he with military precision went to the office of the superintendent of schools for consultation He advocated the teaching of vocal music in the schools but the medical man in him came out plainly in the arguments he made that the singing would greatly develop the lungs of the pupils He was the author or instigator of a series of eye sight tests with the purpose of having the teachers give pupils of defective vision advantageous seats with reference to the blackboards and windows On the day before he died he was at the superintendent s office as usual and talked in the most interested way of the forthcoming high school commencement in making arrangements for which he had spent much time This picture of Moore giving of his best in his declining years to the service of youth reminds us of the role played in a broader way by his great chieftain Robert E Lee

Dr Moore was a member of Lee Camp Confederate Veterans and never gave up his interest in Confederate affairs According to his own wish no flowers were placed on his coffin or on his grave at the time of his interment but on his breast was laid a small Confederate flag and to the lapel of his coat was pinned a Confederate badge He died on May 31 1889 in the early morning and was buried on June in the afternoon in Hollywood Cemetery His comrades and the citizens of Richmond and of the South universally recognized that a most notable figure had passed H R McILWAINE

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

Regular Meeting Held May 23 1924 Dr Charles S Bacon Presiding

SPECIMENS SHOWING IMPLANTATION ADENOMYOMA AND HÆMORRHAGIC CYST OF RIGHT OVARY OF ENDOMETRIAL TYPE WITH ADENOMYOMA IN THE POUCH OF DOUGLAS

Dr Carey Culbertson *First specimen* I have a specimen here which demonstrates better than any I have seen the so called implantation adenomyoma which is similar to the adenomyoma of the rectovaginal septum 4 cases of which Dr Goldstine reported some time ago

This is a uterus containing a fibroid in the posterior wall a small one and on the serous surface



Fig 1 Section of implantation adenomyoma (Sampson) through the base of a submucous fibroid showing glands and adjacent endometrial tissue resembling mucous polyp of the corpus uteri

of the fibroid is a cap of soft spongy material membranous in appearance about 2 inch in thickness *sections of which I will show you*

The specimen was taken from a nullipara 46 years of age who came into the hospital complaining of menorrhagia which she had had for years excessive bleeding for 7 to 10 days every month At 30 years of age she began *flowing* irregularly the period lasting from 1 week to 30 days Two years ago she began to skip periods and flowed every 2 to 8 weeks She missed February but flowed in March and April 1924 The last period prior to operation was on April 3

Sections (Fig 2) show that this material is in all respects like a large polyp of the mucosa of the corpus uteri The glands are definitely endometrial in type and there is an abundant interstitial development There are no hæmorrhagic areas

Second specimen This specimen is in the form of microscopic sections the gross material not being large enough to bring before you I will give a history of the case and then show the slides

This material (Figs 2 3 and 4) is from the pelvis of a young woman who has been under observation since last December She gave a history of having been married 4 years of having never been pregnant *and of having dysmenorrhœa but the thing* that brought her under observation was the pain in the lower abdomen She sometimes thought it was a little more severe on the right side There was no menstrual irregularity whatever In December she *had some sort of an operation which I judge* was nothing more than a dilatation and curettage and a test of tubal pregnancy The test of patency was positive she was told and my findings at examination showed no great evidence of pelvic disease She continued to have pain and dysmenorrhœa and came under my observation this month

I operated upon her late last week after having her under observation for about 10 days to determine whether operation was warranted There was no injunction in the pelvis such as Dr Goldstine reported as present in his cases a few months ago She herself suggested that I remove her appendix At the operation I found a hæmorrhagic cyst in the right ovary which was ruptured the ovary being adherent at the level of the utero tubal ligament with some infiltration of the ligaments to the side The peritoneal surface of the pouch of



Fig 2



Fig 3



Fig 4

Fig 2 Section of right ovary hæmorrhagic (chocolate) cyst showing membrane endometrial type lining the cyst cavity

Fig 3 Section of membrane from the pouch of Douglas showing in all respects similar to endometrium with hæmorrhagic areas suggesting an active menstrual reaction

Fig 4 Section of the Morgagni cyst attached to the fimbriæ of the left tube showing glandular material endometrial type on its surface

Douglas was covered with a thick membranous material which could be wiped away with the finger or with gauze leaving only a slight bloody oozing after its removal Both tubes were free and normal the left ovary was normal and from the left tube a small hydatid of Morgagni hung suspended by a pedicle and was adherent in the cul de sac on the left side being immersed in the membranous material The first section on the screen is from the right ovary and shows a hæmorrhagic cyst containing structure that is endometrial in type the tubules and stroma resembling those of the uterine mucosa of the premenstrual or active menstrual stage The second section is that of the material from the pouch of Douglas which grossly resembles scrapings of a hyperplastic endometrium This section shows a structure in all respects similar to that in the ovary Hæmorrhagic areas are seen which strongly suggest the active menstrual stage of uterine mucosa The third section is from the tubal hydatid On its surface we see again the same type of tissue This membranous development in the posterior cul de sac did not rise above the level of the utero sacral ligaments but did involve the *anterior rectal wall* and its disposition strongly suggests a spill of material from the ruptured ovarian cyst and implantation on the peritoneal surface

DISCUSSION

DR EMIL RIES Dr Culbertson characterized the specimen as due to implantation The development of the glandular structures and of the stroma goes beyond anything I have conceived possible in implantation According to Sampson these cases are implantations of the uterine mucosa escaped through the tube into the abdominal cavity How an implantation of seminecrotic uterine mucosa can occur to such an extent is almost beyond comprehension

A great discussion is going on at present as to whether such structures are due to implantation or to serosal epithelium which is able to produce gland like structures The gland like structures of this tumor might be of either origin But the stroma is the great stumbling block

DR CAREY CULBERTSON I should have said that in this specimen the sections of the uterine wall did not show adenomyoma of the uterus that is an adenomyomatous development and continuation of the uterine cavity That is a very different thing In that respect it differs from the earliest cases of adenomyoma of the rectovaginal septum as reported by Stevens Cullen MacCarthy and several others

As Dr Ries has said there are two explanations one offered by Sampson of implantation and transplantation and the other that of a metaplasia developing from the serosa Both of these explanations are theoretical and it seems to me that it is quite as easy to believe one as the other perhaps not quite as easy as Dr Ries says I showed the specimen and called it an implantation adenomyoma simply taking that term from the work of Sampson which is in the American literature

DR MARK T GOLDSTINE I would like to ask Dr Culbertson if he thought the chocolate cyst was a factor in the dysmenorrhœa I have heard of 3 cases in the last 6 months in which chocolate cyst caused dysmenorrhœa in young women Usually these cysts occur later in life

DR CULBERTSON (closing) I hardly think we could explain the dysmenorrhœa on the basis of a hæmorrhagic ovarian cyst but it might very well result from such a development as a lenomyoma in the pouch of Douglas I might say that I removed all membranous material from the cul-de-sac as thoroughly as possible and resected the cystic portion of the right ovary but removed nothing further

the pelvic organs being in other respects normal The appendix showed a mild chronic inflammatory reaction and was removed

A NEW MANEUVER IN OCCIPITOPOSTERIOR POSITION

DR D A HORNER I want to call your attention to a maneuver we have developed of which we find no mention in the literature It is the manual rotation of the occiput in posterior and transverse positions as a preliminary for the forceps operation However there are many notations of manual maneuvers and they consist of simply this In a case of right occipitoposterior use the hand which fits the occiput and rotate manually In a right occipitoposterior the left hand would be used

The maneuver which I am trying to bring out is one in which only the right hand is used in both right and left occipitoposterior positions In the right occipitoposterior position the dorsum of the hand is applied to the anterior surface of the head with the thumb on the posterior parietal elevation in a clockwise direction That leaves the hand ready for the introduction of a left bladed forceps and keeps the head from rotating In the left occipitoposterior the reverse would be used and the rotation would be counter-clockwise It is sometimes necessary to raise the head out of the pelvis but the head must be in the perineum or in a similar plane It can be raised completely out and at the same time upward and downward pressure can be made on the occiput for the necessary flexion and diminishing of the persisting diameters and it will be easy to bring the head into the pelvis if it is once down and can be lifted off the perineum

This maneuver is a great reducer of mortality in babies We have used it in several hundred cases at the Lying In Hospital If this is of value to any one who tries it I would like to hear about it

DISCUSSION

DR C E PADDOCK For years this has been my treatment of these cases and I am glad that Dr Horner is an advocate of the method The frequency of these cases and the morbidity which follows the usual treatment seems to demand the use of a method such as this which has lessened the morbidity both in the fetus and the mother

DR DAVID A HORNER (closing) In the German French English and Italian literature I have found not a single word about the use of the right hand in the correction of occipitoposterior position I have found that the left hand is used in one case and the right one in the other If Dr Paddock has used it I am very glad to know it I know others have used it but have not put it on record

PSEUDOMYXOMATA PERITONEI

DR EMIL RIES read a paper on pseudomyxomata peritonei (see p —)

DISCUSSION

DR F W FISCHMANN I would like to ask Dr Ries how soon after the rupture of one of these appendices or ovarian cysts may pseudomyxoma peritonei occur? About 2 years ago I saw a woman who had a multilocular pseudomucinous ovarian cyst with symptoms of an acute abdomen A laparotomy was performed within a few hours after the onset of symptoms and the peritoneum was markedly injected and a small amount of mucus was found in the peritoneal cavity due to the rupture *of a small daughter cyst*

I also would like to ask about the firm adhesions that are described in the literature as accompanying this condition and how frequently intestinal obstruction is caused by this

DR EMIL RIES (closing) I do not know how soon after the rupture of an ovarian cyst the patient develop the pseudomucinous condition because in none of the cases was there any indication of the time of the rupture of the ovarian tumor This apparently occurred by gradual stretching or giving way of the wall Some of these patients die from more or less intestinal obstruction and the prevention of adhesions has a large place in the treatment

DR CHARLES E PADDOCK presented a paper entitled Acute Dilatation of the Stomach in Labor

The chairman stated that he considered it eminently proper that a society devoted to the study of the biological sciences as well as to the art of healing should note the passing of one who had contributed perhaps more than anyone else to its fundamental problems

Jacques Loeb was born in Germany in 1859 He studied in Berlin Munich and Strassburg where he received the degree of Doctor of Medicine taught in the Universities of Wurzburg and Strassburg and later went to the Naples Zoological Station In 1891 he came to America and taught in Bryn Mawr University of Chicago and University of California From 1910 until his death he was in the Rockefeller Institute for Medical Research He also worked in the Marine Biological Laboratory at Woods Holl and at Pacific Grove California

His work was of fundamental biological problems especially those relating to the action of living beings the explanation of which he held to rest on a physiochemical basis His thought mechanistic explanation of the conduct of animals himself purposeful He undertook to control the growth of living matter by physicochemical means and used for this purpose all the resources of physical chemistry In this field he made epoch making discoveries on artificial parthenogenesis interesting in the bearing on the nature of fertilization He became convinced that the behavior of colloids could be explained by the ordinary laws of chemistry the proof of which he presented last year at the Institute of Medicine of Chicago

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J. BROWN, M.D., F.A.C.S., Omaha, Nebraska

THE SURGERY OF GIOVANNI ANDREA DALLA CROCE

THE sixteenth century had marked the rise of surgery as apart from medicine and toward the latter part of this period it was looked upon practically as a specialized division of medical practice. The books which had been published contained much that was philosophical in nature and matters of surgical technique and nomenclature were loosely handled. The greater part of medical literature had its origin with either the Romans, Greeks or Arabians and consequently the nomenclature consisted of a mixture of these different languages which had never been separated into its different parts and the various synonyms definitely established. The accomplishment of this task of carefully correlating the synonyms for the different surgical diseases was one of the achievements of Dalla Croce.

Of the man and his life but little is known. He was born in Venice but the exact date is lacking. In 1532 he is noted as a member of the College of Surgeons and about 1560 is spoken of as practicing surgery in Venice with great distinction. For a time he held an official medical position in the town of Feltre—the town whose name was given to an artist Pietro Luzzo who was the son of a surgeon and who originated the then modern grotesques which were so called because the subjects for these arabesques were taken from the decorations of ancient crypts or grotte. For some reason, possibly because of a particularly joyless disposition, he was called Morto (dead) da Feltre. Dalla Croce died in 1575 shortly after the publication of his work which was issued in 1573.

The seven books of surgery by Joannes Andreas de Cruce was printed in Latin and published in Venice in 1573. The following year 1574 an Italian translation was published from the press of Giordano Ziletti in Venice and is the volume reviewed here. Dalla Croce's work was considered at the time to be of sufficient importance to run through several editions and to be translated into German as well as Italian.

The work shows little advance along original lines and is rather a compilation of the work of previous authors arranged in an historical manner. Looking through it one is struck by the meticulous attention paid to surgical technique and particularly by the careful illustration of all operative instruments from the earliest times to the time of writing. As an example the illustrations to the chapter on trephining show at first the coiled strap and bow string trephine and at the end the type of brace and bit which save for the ornamentation is practically identical with that in use today. With this factor in mind the volume might almost be classed as a work on operative surgery.

Dalla Croce in the introduction gives as his authorities the older writers from Hippocrates to Albucasis and makes no claim to originality. He does not mention Brunschwig, Paré or any of the writers of approximately his own time. That he knew of their work, however, is shown by his teachings. His illustration of the withdrawal of an arrow is plainly a changed copy of Brunschwig's illustration of the same procedure. Likewise he illustrates Paré's forceps for removal of bullets and his tubes for drainage. In the text he refers to the facts emphasized by these contemporaries. For example he calls attention to the importance when searching for a foreign body of placing the patient in the same position as he was in when he was wounded. This point was previously stressed by Paré as the result of his experience in the case of de Brissac.

The treatment of wounds advocated throughout the books is surprising for its modernity. In simple incised wounds Dalla Croce does not suture but draws the edges together by placing cloth on either side of the wound and lacing the cloths and not the wound. He illustrates five types of this form of dressing for larger or smaller wound. The idea is similar to the one used during the World War for drawing wound edges together by placing adhesive strips along either side of the wound and lacing the strips together. For suture material he used various forms of needles and either silk or linen thread and of the two he prefers linen. In suturing he warns against dead spaces as likely to cause trouble. For drainage he advises cloth drains and in some instances uses Paré's perforated tube. He opens the thorax and advises that the drain be sutured to the skin so that it will not slip into the cavity and be lost.

The illustrations of surgical instruments are a noteworthy part of the volume and show in historical sequence practically all of the best known instruments up to the time. The various forms of arrows, spears and darts in general use in war are also illustrated. This compilation of illustrations is the second great contribution which this author made to surgery.

REVIEWS OF NEW BOOKS IN SURGERY

A unusual happy and authoritative volume by three writers Duval a surgeon Roux an *internist and Bécl re a rad ologist has gi en us* a clinical study of the duodenum[1] The recent ad vancements in examination diagnosis an l tr at ment of the various lesions of the duodenum are method cally invest gated l y this keen triumvirate

The following points with their complications are discussed The duodenum in combination with gall tones es ential *stenosing* periduodenitis chronic compression of the third portion of the duodenum by the mesenteric pedicle duodeno-jejunostomy radiologic signs of ulcer of the duodenal bulb an l intoxication in duodenal retention

Well selecte l an l convincing roentgenograms il lu trate the text and the reviewer feels that every interni t and surgeon deal ng with duodenal lesions shoul l study this work KELLOGG SPEED M D

THERE *is no operation in neurologic surgery* more gratifying to the patient and satisfying to the surgeon than section of the sens ry root of the f fth cranial ner e for major trigeminal neuralgia In Hartmann s monograph we find a collection an l review of the l terature mainly American upon the treatment of trigeminal neuralgia in a l lition to the author s personal obser ations upon 6, cases which ere operate l upon by various French surgeons One cannot help but feel the comparison between the p ogress an l devel pment of neurol gic surgery in this country an l upon the continent after reading th volume

The major j art of the subject matt r concerns the occurrence of keratitis following d vis on of the sen sory root This is a postoperative complicat n which has interested American neurologic surg ons *for many y ars* Keratitis wh h *follows section of* th sen ory root may be d v le l into

1 That lue to a direct lesion of the gangl on

2 That which may be attr buted to palpebral m l occlu i n

3 That produce l by trauma to an anæsth tic c nea

4 *Th t which occurs in the absence of any of the* preceth g factors and wh ch presents the charac terist cs of an actual trophic lesion

To grasj the significance of Hartmann s theoreti cal explanation of th path genesis of such a kera titi it is necessary to k ep in mind the phys ol gicil results whi h ha e been observed to follow the opera tion It i inter sting to note that the *author has* conf rmed the pres r ation of deep sen ibility in the face after section of the trigem nal nerve and that he acc pts the facial nerve as the afferent pathway *for those f bers which* carry that sen ation In ad lition attention is called to the abolition of the corne l and oculo-car liac reflexes exaggeration of the vasomotor reactions upon cutaneous stimula tion increased reaction of the pupil to d fferent alcaloidal drugs and xaggeration of the sweatin reaction after the inject on of pil ocarpine The last three phenomena are believed to be evi lence of an increased excitability of the nerve termin tions of the organo-vegetative" system It is pro licated that an increase *in the tone of the organo-* eeta tive or parasympathetic sy tem pred poses t a decrease in the local defensive resi tance of th tis sues In other words there is believed to be a liberation of the peripheral parasympathetic s stem by an interruption of the cerebrospinal sensory path way Myosis enophthalmus narro ing of the *palpebral fissure decrease in i tra-ocular tension and* cutaneous vasodilatation are not looked upon as evidence of paralysis of the sympathetic fibers but as the phenomena resulting from irritation of th parasympathetic nerve end ngs n l therefore eleva tion of parasympathet c tonu This pred posing etiological factor plus any of th irect causes pre- viou l y ment oned contributes to the pathogenesis of the keratitis

It shoul l be pointed out that the postoperati e occurrence of keratitis cited by Hartmann is mu h higher than that found in any series of cases pre sented b the neurolog c surgeons of this country Further the frequency of this compl at on has been reduced by a careful improvement in ope ative tech nique It h s always seemed strik g that in exper mental animal in wh ch the symp thet c fibers to *the eye ar closely related to the gangli n n it* entire y keratit s is an almost co st t postopera ti e result. In man it is well known th t the sympath tic fibers to the eye are closel related to the ophthalmic d vi ion and the medial aspect of the ganglion It is fact that by not d sturbing the ganglion from it bed and by a oiding the med al *side nd the ophthalmi di ision* the occu rence of keratitis has been materially reduced To say that keratitis is produced by parasympathet c timula tion rath than sympatheti paralys seems to be engag ng in a rather futile search for an explanatio The careful st dy of the results of cervical sym pathectomy m y throw some interesting s delights *upon the question and* it would not be surprising to find in the pathology of the sympathetic system th explanation for many of the bizarre facial p n s closely resembling majo neuralgia as well as the oc urrence of a keratitis. It should ot be *inf rred* that postoper ti e keratit occurs so frequent y as to offer a contraindication to the h f of trige *minal neuralgia by s ction* of the sensory root.

[1] Etudes Clinico-Radiologiques sur le Duodenum By Pierre Duval Louis Roux and Charles Richet Paris Masson et Cie

[illegible]

The remainder of the subject matter brings under one cover the mass of literature exclusive of surgical technique concerning major trigeminal neuralgia The small volume is indeed worth while

LOYAL E DAVIS

THE surgery of the sympathetic nervous system has recently received a great impetus How ever it seems prone to be carried farther than our present knowledge of the physiology and anatomy of this portion of the nervous system might justify Unfortunately the tendency rather empirically to remove or interrupt portions of the sympathetic sys tem is quite apt to bring discredit to a surgical therapeutic principle which may have very definite and limited indications

So it is with a feeling of regret that we see in Jonnesco's new work[1] beautiful plates illustrating the gross anatomy of the cervical sympathetic sys tem unaccompanied by a complete discussion of physiological facts or theories which might establish a firm foundation for this new field of surgery When confronted at the operating table with the actual structures we realize how diagramatic such illustrations may be

There are few facts in surgical therapeusis which have withstood rigid tests which are not founded on firm physiological and anatomical principles capable of being demonstrated experimentally It is a banal ity to state that there is no short cut to proving indications for surgical therapy So it seems better to view with healthy skepticism the attempts to cure glaucoma hyperthyroidism epilepsy angina pec toris facial neuralgia and migraine by interrupting the cervical sympathetic trunk Particularly is this so when the experimental evidence is so sadly lacking to point the way

It is a safe conjecture to say that those operations upon the sympathetic system which now exist for a score of maladies will eventually be reduced to a modest number and it is safe to say further that such indications will rest upon rather strong cor roborative experimental evidence

LOYAL E DAVIS

[1] L S TH O C TH RACIQ By P f Th m J sc P M «so t Cic 9 3

AMERICAN COLLEGE OF SURGEONS

REPORT OF HOSPITAL STANDARDIZATION FOR THE YEAR 1924 UP TO OCTOBER 1

INCLUDING LIST OF APPROVED HOSPITALS OF THIRTY FIVE OR MORE BEDS IN THE UNITED STATES AND CANADA

THE American College of Surgeons has completed the seventh annual survey of hospital in the United States and Canada The list of approved hospital published herewith shows the result of (1) the seventh survey of *hospitals of one hundred beds and over* (2) the third survey of hospitals of fifty to one hundred beds (3) the preliminary survey of (a) hospitals of thirty five to fifty beds (b) National Homes for Disabled Volunteer Soldiers (c) Marine Hospital of the United States Public Health Service

During the year twenty-one hospitals in New Zealand Australia and Hawaii were visited but as the survey has not yet been finished the list as published in this report is incomplete It is expected that the survey of these hospitals will be completed before the first of the year and the list of hospitals published in the January *Bulletin*

PROGRESS OF HOSPITAL STANDARDIZATION

Hospital standardization a movement for hospital betterment though carried on actively for only 7 years has made splendid progress as shown by the following statistics

1924

A Approved hospitals of 100 beds and over—

Number of hospitals surveyed	961
Number of hospitals approved	831
Percentage	86 5

B Approved hospitals of 50 100 beds —

Number of hospitals surveyed	0 3
Number of hospitals approved	508
Percentage	52 2

C Approved hospitals of 35 50 beds —

Number of hospitals surveyed	307
Number of hospitals approved	49
Percentage	15 9

D Summary for 1924—

Total number of hospitals surveyed	2366
Total number of hospitals approved	1416
Average percentage for the United States and Canada (50 beds and over)	69 3

E Summary—

(1) Seven surveys of hospitals 100 beds and over

Yea	Hospitals surveyed	Hospitals approved	Percentage
1918	69	89	2 9
919	692	198	8 6
1920	692	4 7	58 8
92	61	5 3	75 3
922	8 2	677	83 4
9 3	870	751	86
1924	961	83	86 5

(2) Three surveys of hospitals 50–100 beds

9	81	335	41 3
1923	916	430	46 9
1924	973	508	52 2

The hospital program of the American College of Surgeons as expressed in the minimum standard *has developed rapidly and taken firm root in* the hearts and mind of the people of America There is an increasing demand for it from all quarters The movement has become its own propagandist for it has proved its worth The program is definite its requirements reasonable its methods of presentation acceptable The requirements are universally recognized for they aim at focusing the hospital's attention directly on the patient This surely means much to the *12 000 000 patients passing through the hospitals* of the United States and Canada annually

INCREASING INTEREST AND CO-OPERATION IN HOSPITAL STANDARDIZATION

Hospital standardization in its few years of existence has accomplished much for better hospital service This is due in no small part to the keen interest and co-operation manifested not only on the part of the hospital themselves but also of *the medical and nursing professions* the public and the numerous allied organizations in the field national state provincial and local

During the year the utmost co operation and assistance has been forthcoming from the Council

on Medical Education and Hospital the Ameri can College of Physicians the American Society of Clinical Pathologists the various radiological associations the American the Catholic the Protestant and the Methodist Hospital Associa tions the Central Council on Nursing Education and other national state provincial and local allied associations as well as numerous govern mental departments

This year requests to include their respective groups of hospitals in the survey were received from the Board of National Homes for Disabled Volunteer Soldiers the United States Public Health Service and the United States Veterans Bureau All this work has been completed except ing that of the Veterans Bureau Hospitals which work has been commenced but will not be finished till the first of the year

It is only through whole hearted interest and co-operation of this kind that much can be accom plished by the College while on the other hand the College is anxious to co operate with the various groups mentioned and be of any service it can to them

AIMS AND OBJECTS OF HOSPITAL STANDARDIZATION

The objects of the hospital standardization movement are definite and practical They may be summarized as follows

(1) To focus all the activities of the hospital on the patient We recognize today that the pa tient is the most important person in the hospital and all activities should be carried on with this always borne in mind Every per on in the ho pital organization regardless of what he does has a unit of service to contribute toward the patient s welfare Hospital service is composite in nature—all focusing on the patient (2) To provide in hospitals adequate and efficient organization per sonnel facilities and procedure so as to insure for the patient (a) an early accurate comprehensive diagnosis (b) the most rational and scientific treatment (c) *the rapid return of the patient to* normal physical health if at all possible It is the responsibility of every ho pital to provide this for each patient treated therein It is the minimum the patient is entitled to (3) To promote better co-operation in and among the three groups di rectly connected with the ho pital namely the board of trustees or governing body the medical staff and the hospital staff or personnel These three bodies must work well together in the per formance of their common task—caring for the patient Within each group harmonious co operation is very essential for success (4) To promote better co-ordination throughout the in stitution Analysis of hospital service shows clearly that it is made up of a number of distinct units differing in character but interrelated and interdependent to a very marked degree These units must be well co-ordinated in order to secure the best final results Hospital standardization is bringing this co ordination about (5) To stimulate more interest in clinical work Through the periodic staff conferences for analysis of the professional work of the hospital through good records and available adequate diagnostic and therapeutic facilities it is only reasonable to ex pect that more interest will be aroused in the clinical work—especially in a closer study of end results (6) To educate the public as to the right kind of hospital service The hospitalization of the sick is a big problem today On the average one out of ten persons in the United States and Canada goes into hospitals for treatment annually —last year almost twelve million people went through these hospitals the outlay for mainte nance was approximately one billion dollars When we realize this is it not essential that the public be intelligently informed as to hospitals and the service they not only wish to give but are respon sible for giving in the right way?

The minimum standard so well known to you all grew out of clear thinking minds with vision and proper perspective in search of ways and means to improve surgery The founders of the movement discovered a need for improvement in hospital service and established a practical rem edy in the minimum standard requirements—a measure of professional efficiency and service to the patient Though this tandard is minimum in name a proper interpretation shows that it is maximum in effect and application for it has a beneficial influence on all the service throughout the institution the aggregate effect of which is reflected ultimately in the care of the patient and results obtained

Finally it may be justly claimed for this pro*gram that when con cientiously* applied at least four important benefits will accrue therefrom These are (1) the shortening of the number of day the patient stays in the hospital (2) the elimination of incompetent and unnecessary sur gery (3) the reduction of infections and com plications and (4) the lowering of the hospital death rate

Any ho pital can accomplish these if imbued with the proper spirit and interest in this move ment It is the serious responsibility of all hos pitals to give careful attention to the above four suggestions

THE PRESENTATION OF THE HOSPITAL STANDARDIZATION PROGRAM TO THE FIELD

The program of hospital standardization is presented through personal visits from a group of carefully selected hospital visitors or surveyors graduates of Class A medical schools with hospital experience and executive ability These representatives are thoroughly familiar with the application of the requirements of hospital standardization They survey the institution according to a well outlined procedure and record their findings on a prescribed form for that purpose thus making all inspection uniform This report is sent immediately to headquarters and with other data is fully considered It must be remembered that the visitor is not there to pass judgment on the hospital but to *find the facts* in an impartial unprejudiced manner and report same to headquarters and there it is determined whether or not the hospital meets the minimum standard The personal visits and the impartial manner in making the report appeal to the hospital as an unprejudiced effort to arrive at facts A follow up service is then instituted and all the assistance necessary rendered from headquarters to eliminate deficiencies in hospital service

Hospital Standardization Explained

STAFF ORGANIZATION

Efficient staff organization is essential for the professional success of any hospital Such an organization sets forth definite requirements for membership and should be based on the following principles or considerations

The staff of the hospital as interpreted in the minimum standard requirements laid down by the American College of Surgeons includes all doctors privileged to practice in that institution whether or not already organized into other groups such as consulting staff appointed staff courtesy staff or others

The board of trustees guards carefully the granting of privileges to practice in the hospital This is extended only to those who are (a) full graduates in medicine in good standing and legally licensed to practice in that particular state or province (b) who are competent in their respective fields of activity and (c) who are ethical in business and practicing method Non medical practitioners have no place in an approved hospital Likewise any doctor practicing method regarded generally by the profession as unethical unsound unscientific or commercial is debarred from use of the hospital facilities

The board of trustees and staff go definitely on record against the practice of fee-splitting by the unanimous adoption and enforcement of the anti fee splitting resolution In this connection it is recommended that the resolution or the rules and regulations embodying it be signed individually by the doctors having the privileges of the hospital

The staff formulates rules and regulations setting forth the organization and procedure for the guidance of the professional work of the hospital These are then approved by the board and finally adopted by the staff and the individual members thereof affix their names to them as an evidence of good faith that they will abide by these requirements

A staff requires certain officers and committees in order to function It is advisable that there be a chairman and a secretary both having leadership and initiative and a few working committees such as an executive committee to look after the business and administrative affairs coming before the staff and standing and special committees to take up the work as necessary—the former carrying on during the entire year and the latter for the time required to accomplish the special work assigned

It is of the greatest importance that the staff which includes all physicians privileged to practice in the hospital meet in conference regularly at least once a month at a specified time and place preferably in the hospital The staff conference is the main objective of organization

The agenda for the staff meeting provides a thorough review of the hospital service during the period under consideration and as outlined in the monthly analysis sheet submitted The discussion is analytical in type and includes all the data concerning the volume and quality of work carried on The major attention is directed to the latter or the quality of work and this is brought out in a free and open discussion of agreement and disagreement of diagnoses frequency of consultations infection unimproved deaths and anything else closely related to the clinical work It should consist of a complete medical audit The discussion is always impersonal and the criticism constructive in nature The meeting is characterized by a spirit of unselfishness each member being willing and anxious to give of his experience for the benefit of others and to receive from them for his own Each physician permitted to practice in the hospital shows his loyalty to the institution in fulfilling his duty as a staff member by supporting a clear straightforward analysis of the clinical assets and liabilities

The staff conference is in other words the periodic medical audit which each hospital must have It is important to have a well arranged and interesting agenda for this conference This agenda usually includes (a) a discussion of business and administrative matters pertaining to the professional work of the hospital which embodies after the roll call of members and the reading and disposal of minutes of previous meetings the report of various committees and new business Too much time cannot be taken up with this phase *It is recommended that the business and* administrative details as referred to above be dealt with at a previous meeting of the staff or executive committee (b) A discussion of the clinical work of the hospital having for its main objective a thorough analysis or audit for the period under review as follows (1) The presentation of a report of the work of the hospital for the month on blackboard or through the distribution of the monthly analysis sheets properly filled out (2) the discussion of patients discharged since the last review period with special reference to infections deaths or unimproved (3) the discussion of the condition of patients in the hospital such as complications unusual conditions or intricate diagnoses (c) the presentation and discussion of reports on case records and diagnostic and therapeutic departments as the clinical laboratory X ray etc (d) the considerations and recommendations for the improving of the professional service in the hospital A record is kept of all the proceedings of each meeting and these are available for the hospital representative when making his survey

CASE RECORDS

It has been well said A hospital without records is like a clock without hands still running but giving out no information as to whether it is right or wrong Case records are as necessary to a hospital as water is to a river Every hospital without exception must have them

It is *primarily essential that in each hospital* there is a definite determination on the part of the medical staff the hospital staff and the board of trustees that good records are essential and must be secured on every case that passes through the institution Records after a routine fashion are useless They must be the outcome of sincere and interested effort *An efficient record system in a hospital presupposes* (a) A well organized and arranged department having adequate space and equipment such as desks filing cabinet typewriter and supplies including the forms to be used In respect to the latter there are several types in use Some hospitals use the ordinary blank forms while others prefer the semi stereo or semi diagrammatic type The American College of Surgeons submits samples upon your request However the form used is of little account as compared with that which is really on it The medical staff in co-operation with the superintendent decides on the type of form used in that particular hospital

(b) A personnel for the department such as a record clerk or librarian with the assistants necessary for carrying on and developing the system When such is not possible the responsibility is placed on some member of the hospital staff having a knowledge of this particular work and who will see that the system works smoothly

(c) A definite method for securing histories of patients This appears to be a difficult task in some hospitals There are five methods found in use These are (1) the taking of the history by the doctor himself (2) the dictating of the history by the doctor to a clerk who transcribes it into typewritten form (3) the use of the dictaphone by the doctor (4) the taking of the history by the interne who writes it up (5) a combination of methods by which the history is secured through some means other than by the doctor who adds the physical findings and technical information A quiet convenient place on the ward with the necessary supplies readily available will assist materially in the producing of records

(d) A proper supervision of all the record This is important in order that good quality may be assured There should be a triple supervision exercised in every hospital as follows (1) The doctor in charge of the patient should be responsible for seeing that a history of good quality is promptly produced and when completed should affix his signature thereto (2) the record clerk or librarian should be held responsible for seeing that all the parts of the record and finding are assembled into the patient's permanent file (3) the efficiency or record committee of the staff in most hospital *should go over all the histories at regular* intervals for the purpose of appraising them Sometimes this function is assigned to a duly appointed medical registrar

(e) A complete record of component part The record being a clear logical story of the patient with all the data about the illness the treatment and the after results must therefore be composed of logical units contributed usually through many source These component parts are

1 *Identification data*—giving name of hospital name address and case number of the

patient color age occupation nationality religion dates of admission operation and discharge

2 *Complaint*—the patient s statement of rea sons (signs and symptoms) for seeking medical aid

3 *Present illness*—an orderly story of the onset and course of the disease beginning with date mode of onset and probable cause and continuing with description of signs and symptoms of the disease or injury up to the pre ent time

4 *Past history*—a summary of the patient s life in its relation to pathology illnesses with or without complications operations or accidents habits social conditions or any data which may be related to the present condition

5 *Family history*—such data as related to pres- ent illness investigation of evidence of hereditary or infectious diseases

6 *Physical examination* (not opinions but facts) —a complete detailed description by re gions or systems of the doctor s actual findings as a result of a thorough examina tion of the patient

7 *Special examinations*—con ultations reports of clinical laboratory X ray examinations and other findings

8 *Provisional diagnosis* (and indications for treatment)—a statement of the most plau sible pathological condition to be recorded after completion of history and physi al examination

9 *Treatment medical or surgical*—includes a record of all orders for medicine treat ments and diets If operated on the pre operative diagnosis should be written be fore the operation begins Give a full description of operative procedure and findings normal and abnormal and of all organs explored

10 *Pathologist s report*—a full description gross and microscopic of tissues removed

11 *Final diagnosis*—to be recorded when deter mined Secondary and associated diagnoses should be recorded in the order of their importance

12 *Pro ress notes*—an orderly story of the course of the di ease consisting of note made each day for serious cases of new signs and symptoms complications consultations removal of drains splints and stitches development of infection in a clean wound its cause and character and all other data affecting the course of the disease

13 *Condition on discharge*—a specific statement as to patient s condition in relation to normal health with positive or negative evidence of persi tence of any symptoms pertaining to illness carrying with it in formation providing a prognosis and indi cations as to fitness of the patient to return to active or working capacity

14 *Follow up records*—concise notes made at subsequent visits of the patient or from subsequent reports as to condition of pa tient to determine end results of treatment and appraise the work of the institution

15 *Autopsies*—in case of death and postmortem examination a full description of autopsy findings

Filing of records Every hospital should have a good filing system Record being kept for many purposes must be well preserved and filed in a readily accessible manner for reference

There are various methods u ed for filing rec ords in hospitals today Preference however i given to the envelop and vertical or folder sys- tems which are believed to be more practical and convenient. Each envelop or folder contains the complete data regarding the patient illness and should have on the outside in a readily visible location the necessary data for identification such as the patient s name and number at least. In many instances more detailed data i found and this also is commendable

All records should be properly indexed Thi pre upposes a well arran ed record department under competent supervision of a record librarian or some person to whom this duty has been dele gated who should have a working knowledge of the fundamental of an efficient filing system

A practical filing system includes the followin

a Index for identification of patients whereby the record can be found at least by name or num ber This may be further elaborated into indice for date of admission date of discharge service or other divisions However the former two a mentioned above the patient s name and num ber supply the es ential information for ready and accurate identification

b Index of diseases or diagnoses a cording to a classification by systems affected or anatomical or regional divi ion Se eral nomenclatures are available namely Standard Mas achuse ts Gen eral Bellevue Dewey Post and many others Many ho pital build up their own nomenclature

c Indices for (1) as ociated diseases or dia noses (2) secondary conditions or complication (3) operations (4) cau es of death

d A monthly analytical summary of the work according to the analysis sheet as suggested by the American College of Surgeons showing vol ume of work done in all departments and results obtained

It is advisable that in developing a filing system of this kind a hospital start out in as simple a manner as possible gradually developing the system to cover the range of amplification indicated

Follow up It is recommended that each hos pital institute and develop a follow up system of some kind for their patients Through such means only can we properly appraise the work of the institution and determine intelligently the end results of treatment Hospitals are showing more interest in this matter at present

Progress record Ho pitals generally must pay more attention to the progress records of their patients This consists of a logically arranged story of the course of the disease including notes made each day for serious cases and a record of new signs or symptoms complications consulta tions removal of drains splints or stitches and of the development of infection in a clean wound with its cause and characteristics The development of complications should be descriptive of physical findings and all procedures used in mak ing the diagnosis and treatment rendered

Condition on discharge It is important that the condition on discharge of all patients be fully described This cannot be properly done by using a mere word such as cured or well im proved unimproved or died There must be a specific statement as to the patient s condi tion in relation to normal health with positive or negative evidence of the persistence of any symp toms pertaining to the illness The condition on discharge should carry with it information providing a prognosis and indications as to the fitness of the person concerned in relation to working or active capacity

CLINICAL LABORATORY

Every modern hospital has a well equipped and organized clinical laboratory with adequate space properly lighted and ventilated and conveniently located to the professional services of the hospital Such a department provides at least the following services chemical bacteriological serological and pathological It i essential that all tissues removed at operation be examined pathologically and the gross and microscopic findings carefully recorded

Occasionally these clinical laboratory services have to be secured from outside and under such conditions they must be readily accessible so that too much time is not lost in giving the patient the advantages of them It is necessary to have the laboratory under competent supervision in order to be efficient This is best done through the medium of a clinical pathologist but where such cannot be obtained the supervision may be car ried on by a member of the medical staff having knowledge of this work Trained technicians under competent supervision render most favor able service Records of all work done are kept in duplicate one copy filed in the department and the other sent up to the ward to become a part of the patient s history

There are several ways in which hospitals fi nance laboratory service (a) they charge in accordance with a regular schedule of prices at so much per test (b) they include laboratory service in the per diem rate charged to the pa tient (c) they charge a flat rate to include all the laboratory work (d) they allow a free service such as might be granted by a federal state county or endowed laboratory (e) they permit the pathologist to collect the entire fee and he in return give to the hospital a complete service

However the system used must not limit or embarrass the amount of work called for or re quired in the best interests of the patient.

While hospital standardization emphasizes the importance of a well organized and equipped de partment as mentioned above yet the primary consideration is *the necessary volume of efficient work being done for the patient*

X RAY DEPARTMENT

Like the clinical laboratory the X ray depart ment is also essential in every hospital It should have the necessary space be properly lighted and ventilated and conveniently located in the professional ervices It should be organized and equipped to do radiographic and fluoroscopic work at least Superficial and deep therapy is advisable where possible and practical A port able unit added to the equipment is of great value for cases that are not conveniently and safely transportable from the ward to the department Supervision through a medical roentgenologist is essential not only from the standpoint of administration and the carrying on of complicated tech nique but particularly on account of the inter pretation of findings which can only be properly done by such a trained person Records of all examinations are made in duplicate one copy be ing kept in the department the other sent to the patient s file on the ward as part of the history The films or plates are filed in a systematic man ner so as to be readily accessible when required

Hospital Standardization and the Small Hospital

The work of the College during the past 7 years has revealed an urgent need for extending the survey to the next group of hospitals namely those from twenty five to fifty beds in size In the beginning of the year there were three thousand three hundred and twenty two active general hospitals in the United States and Canada of twenty five beds and over registered with the College for survey Of this number 861 or twenty six per cent with a bed capacity of 179 507 were one hundred beds and over 922 or twenty seven per cent with a bed capacity of 59 0 9 were fifty to one hundred beds and 1 1 529 or forty seven per cent with a bed capacity of 48 ,27 were twenty five to fifty beds Thus forty seven per cent or almost half the number of hospitals in the United States and Canada are in the twenty five to fifty bed class

It is interesting to note the distribution of these hospitals in relation to population We find that approximately twenty two per cent are in cities of 100 000 or over six per cent in cities of 50 000 to 100 000 eight per cent in cities of 5 000 to 50 000 fifteen per cent in cities of 10 000 to 25 000 and forty nine per cent in rural communities under 10 000 This however does not mean that all hospitals of twenty five to fifty beds are found in areas of 10 000 population or less but it is a fact that a large percentage of them are to be found in such communities

The College is firmly of the opinion that there is a real work to do for this group of hospitals—twenty five to fifty beds Many reasons can be put forth for this

There has been an ever increasing demand not only from the hospitals themselves but also from the public for the College to extend the hospital betterment movement and service to the group of institutions of twenty five to fifty beds as over fifty per cent of the people it is stated live in the rural communities and the larger percentage of these institutions are found there It i reasonable to claim that these hospitals serve a most worthy group who are entitled to efficient hospital service

Hospitals in this class have more professional difficulties proportionately than the larger ones Not only are here deficiencies in professional service due in some cases to lack of first hand knowledge but occasionally there exist jealousies among the profession which tends to diminish good co-operation consultations etc Under these circumstances the College has already been of constructive assistance

In many instances we find the dishonest unethical fee- plitting doctors driven from the larger well regulated approved hospital and carrying on in the smaller institution unchecked and uncontrolled in his professional work The only remedy for this condition is to have these institutions standardized also in order that such doctors can be eliminated or properly controlled There is a very apparent need for this today

It is well known from our daily experience that there are many emergency or acute surgical cases which are not safely transportable There is therefore a very urgent need to have these smaller hospital adequately organized and equipped to deal with such cases Many hospital of twenty five to fifty beds lack scientific facilities and are having financial difficulties The College can frequently help solve this problem by bringing about better team work and co-operation between the larger and smaller institutions or between the hospital and the state or province in services such as X ray and Clinical Laboratory Grouping of these services can be done at a great financial economy The problem for each institution however must be worked out on its own merits This can best be done by the College representative through his personal visit

Thus the College through a service of this kind can be a factor in making available better hospital service for the mass of people To this end the College has this year made a preliminary survey of all the hospitals of thirty five to fifty beds in the United States and Canada a list of the approved appearing in this report

Hospital Standardization and the Future

From the experiences of the past seven years the College finds it advisable and necessary to visit the hospitals annually in order to insure the best and most permanent results The personal visit of the representative each year does much to keep the hospitals up to the standard as well as affording an opportunity for constructive aid in solving many of the more intricate professional problems that arise from time to time To this end the College has endeavored to visit all the hospitals of fifty beds or over again this year

The College further realizes that no survey can be carried on successfully without giving concurrently an extensive background or supporting service Accordingly the Hospital Information and Service Department has been organized during the early part of the year The work of this new department has grown rapidly and in the

first ten months of its operation served 1 042 in stitutions seeking information and assistance in the solving of their problems and increasing the efficiency of the institution This service is ren dered through carefully edited letters or articles of information compiled at headquarters through abstracted authoritative information and package libraries sent out on loan The department has been able to give the field a much quicker service than formerly On very urgent occasions a pre liminary wire giving data in abstract may precede the package library in order to expedite matters The service is free to any hospital upon reque t

There have been ever increasing demands of various kinds made on the College during the year which have been met so far as it was physi cally and financially possible The attendance and interest at the Hospital Conference of each Sectional Meeting has greatly increased and early in the series of meetings it was found necessary to extend the program to the second day A large number of round table conferences have thus been held affording all the hospital people an oppor tunity to informally discuss their problems

In giving serious thought to the present and future development of the ho pital standardiza tion program the College feels that the time has now arrived when greater thought must be di rected to (1) the giving of more attention by the hospitals to follow up and end results (2) the developing of minimum standards for the various clinical services and departments in hospital This year the College has emphasized these two matters particularly in the numerous Sectional Meetings held in the United States and Canada and will continue to stimulate more interest in them

It is most gratifying to note that greater atten tion is being paid to follow up and end results in hospitals today This is the only way in which we can make a real appraisal of the work and properly compare statistics No institution can be conducted in a comprehensive manner without close follow up of all patients discharged and periodic interpretation of end results

The hospitals today are looking for standards and especially such as are minimum and practical Valuable service can be rendered by the College in submitting carefully worked out minimum standards It is the earnest desire of the College in this work that the institutions standardized will not be satisfied with merely meeting the minimum but will go on ever increasing in efficiency until the maximum is reached

During the past year a minimum standard for fracture service in hospitals was established This standard was submitted by the Fracture Com mittee of the American College of Surgeons after extensive investigation and subsequent study of data received through carefully selected regional sub committees in all parts of the United States and Canada This standard has been very well received throughout the field The following are the recommendations by the Committee

A That all general hospitals be equipped to care for fractures that the minimum equipment for the transportation and emergency treat ment of fractures be the following or its equivalent
   1 Thomas upper extremity splints
   2 Thomas lower extremity splints with trac tion straps slings and buckle straps
   3 Hodgen splints
   4 Coaptation splints assorted sizes
   5 Cabot wire splints
   6 Straight pieces of wood (of assorted length width and thickness) for splints
   7 Plaster of Paris bandages
   8 Some form of overhead frame for suspen sion
   9 Suitable X ray apparatus including a port able machine if practicable
B That it is highly desirable that one individual surgeon be responsible for the supervision of the care of fractures in each hospital service
C That special record sheets be used for fractures

More recently a minimum standard for history taking has been recommended by the Committee of the College on History Review an outline of which is to be seen in the text of this report under the heading of Case Records

The College has attempted in its program and will attempt in the future to stimulate more in terest in the organization and administration of clinical departments in hospitals The programs of the Sectional and General meetings include interesting papers and discussions on the essen tials for the organization and administration of such special departments as surgery medicine ophthalmology oto laryngology obstetrics and other services It is hoped that minimum stand ards may in time be established for these as a guide in hospital service and development

ANALYSIS OF HOSPITAL SERVICE

For Month Ending

DISCHARGED

Cured	48
Improved	117
Relieved	0
Unimproved	8
To return for secondary operation	2
Admitted for diagnosis only	1
Death within 48 hours	2
Deaths institutional	8
Released	0
Labor	42
Newborn	43
Total discharged	71

CAUSES OF DEATH

Rectocecal abscess
Endocardium malignant
Illuminating gas poisoning
Peritonitis tuberculous
Umbilical hæmorrhage newborn
Stillborn
Premature birth
Infectious jaundice infant
Strangulated femoral hernia
Cerebral hæmorrhage traumatic

DIAGNOSES

Provisional and final agree	162
Provisional and final disagree	17
Discharged with additional diagnosis	0
Discharged with no diagnosis made	8
Labor	4
Newborn	42
Total discharged	37

Total deaths

INFECTIONS

Institutional		On Admission	
Medical	0	Medical	0
Surgical	5	Surgical	1
Obstetrical	0	Obstetrical	0
Total infection	5	Total infection	12

UNIMPROVED

Operation advised
Suspected carcinoma stomach
To return for operation
Hypertrophied tonsils no operation
Hyperthyroidism myocarditis
Tuberculous peritonitis pulmonary tuberculosis
Brachial paralysis
Fractured ulna—to return for further treatment

CONSULTATIONS

Asked and obtained	24
Asked not obtained	0
Indicated not asked	0

DEATHS

Medical	3
Surgical	2
Obstetrical	0
Newborn	4
Stillborn	2
Total death	11

AUTOPSIES

Medical	0
Surgical	0
Obstetrical	0
Newborn	1
Stillborn	0
Total autopsies	

Total unimproved

CASE HISTORY DEFICIENCIES

Case Number	Identification data	Chief complaint	Present illness	Family history	Habits	Physical examination	Special reports	Consultation	Clinical laboratory	X ray	Other	Diagnosis	Medical or surgical treatment	Pathological findings	Gross	Microscopic	Progress note	Final diagnosis	Condition on discharge	Follow up	Autopsy
4965				√								√				√				√	
4969					√	√											√				
4970			√					√					√							√	
4973																	√				
4974			√			√		√								√					
4979		√		√						√							√			√	
4981					√				√												
4986			√			√		√									√				
4989										√										√	
4990				√			√							√					√		
4995														√			√				
4999				√								√								√	
5000		√									√					√					
500				√					√									√			
5004			√					√								√					
5 0			√			√							√								
5 11				√							√			√						√	
5 13								√			√										
5 17						√							√				√				
5019		√							√						√						
50 5				√										√							
5 27			√									√									
50 8					√														√		
5 29										√											
5030			√								√									√	
Total		3	7	7	3	5	1	5	3	3	4	3	3	4	1	4	6	1	2	7	

LABORATORY REPORT

Urinalysis	
Routine	2 6
Functional	2
Quantitative	28
Cultures	11
Blood Examinations	
R B C	121
W B C	182
Differential	60
Hæmoglobin	139
Coagulation time	122
Typing	6
Wassermann	47
Widals	12
Cultures	14
Blood chemistry	
Blood sugar	16
Blood urea	17
Non protein nitrogen	4
Creatinin	11
Uric acid	14
Others	0
Tissues	
Gross	47
Microscopic	47
Spinal Fluid	
Cell counts	8
Colloidal gold	9
Cultures	6
Globulin	7
Wassermann	9
Gastric analysis	10
Stool examinations	8
Smears	13
Animal inoculations	4
Sputum examinations	23
Vaccines	8
Exudates	5
Transudates	7
Throat cultures	21
Basal metabolism	11
Autopsies	6
Miscellaneous	0
Total	135

REPORT OF X RAY DEPARTMENT

Radiographic examinations	51
Fluoroscopic	23
X ray therapy	15
Total	89

NUMBER OF HOSPITALS MEETING THE MINIMUM STANDARD

	100 or more bed			50 to 99 bed			All hospitals 50 beds		
	Number of hospitals	Approved		Number of hospitals	Approved		Number of hospitals	Approved	
		Number	Percentage		Number	Percentage		Number	Percentage
Alabama	10	9	90	17	6	35 3	27	15	55 6
Arizona	2	2	100	5	2	40	7	4	57 1
Arkansas	6	5	83 3	10	6	60	16	11	68 8
California	56	48	85 7	34	11	3 4	9	59	65 6
Colorado	12	1	100	9	4	44 4	21	16	76 2
Connecticut	16	16	100	12	4	33 3	28	20	74 3
Delaware	1		00	2	1	50	3	2	66 7
District of Columbia	12	10	83 3				3	0	76 9
Florida	6	3	5	9	3	33 3	15	6	40
Georgia	12	9	75	17	8	47 1	29	17	58 6
Idaho	1	1	100	8	6	75	9	7	77 8
Illinois	69	47	66 7	6	0	34 4	13	67	5 5
Indiana	22	18	81 8	15	10	66 7	37	28	75 7
Iowa	14	13	92 9	24	15	6 5	38	28	73 7
Kansas	6	6	100	28	17	6 7	34	3	67 0
Kentucky	8	8	00	18	9	50	26	17	69 2
Louisiana	7	7	100	11	8	7 7	8	15	83 3
Maine	5	5	100	11	4	36 4	16	9	56 3
Maryland	16	15	93 8	10	7	70	26	22	84 6
Massachusetts	49	44	89 8	34	0	58 8	83	64	77 1
Michigan	26	4	92 3	22	14	63 6	48	38	79 2
Minnesota	27	26	96 3	1	1	52 4	48	37	77
Mississippi	6	4	66 7	10	3	3	16	7	43 7
Missouri	35	6	74 3	9	10	52 6	54	36	66 7
Montana	9	7	77 8	9	5	55 6	18	12	66 7
Nebraska	1	8	66 7	13	4	30 8	25	12	48
Nevada	0			2	2	00		2	00
New Hampshire	2	1	50	12	10	83 3	4	11	78 6
New Jersey	38	36	94 7	13	1	76 9	51	46	9 2
New Mexico	0			5	4	80	5	4	8
New York	37	12	89	78	39	50	215	161	74 9
North Carolina	8	5	62 5	22	15	68 2	3	20	66 7
North Dakota	5	5	100	7		28 6	2	7	58 3
Ohio	44	42	95 5	37	4	64 9	81	66	81 5
Oklahoma	2	2	100	4	2	4 3	6	4	25
Oregon	5	5	100	4	4	8 6	9	9	47 4
Pennsylvania	89	79	88 7	82	38	46 3	71	117	68 4
Rhode Island	4	4	100	3	2	66 7	7	6	85 7
South Carolina	7	4	57 1	9	3	33 3	16	7	43 7
South Dakota	5	5	100	12	0	83 3	17	5	88 2
Tennessee	10	9	90	12	8	66 7	22	17	77 3
Texas	21	9	90 5	32	17	53 1	53	36	67 9
Utah	5	5	100		1	100	6	6	00
Vermont		1	100	5	4	80	6	5	83 3
Virginia	7	7	100	3	22	71	38	29	76 3
Washington	9	6	84 2	19	9	47 4	38	25	65 8
West Virginia	8	6	75	2	33	61 9	29	19	65 5
Wisconsin	27	2	81 5	26	1	4 3	53	33	62 3
Wyoming	2			6	3	5	8	3	37 5
Total for United States	89	769	86 3	893	46	51 6	1784	1230	69 9
Alberta	7	7	100	4	4	00	1	1	100
British Columbia	7	7	100	7	3	4 9	4	10	71 4
Manitoba	9	9	100	1			10	9	9
New Brunswick	2	2	100	9	8	88 9	11	10	91
Nova Scotia	3	3	100	9	9	100	12	12	100
Ontario	6	0	76 9	30	1	36 7	56	31	55 4
PEI	0			3	3	100	3	3	100
Quebec	1	1	9	9	5	55 6	9	15	78 9
Saskatchewan	5	4	80	8	4	50	13	8	61 5
Total for Canada	70	6	88 6	80	47	58 8	40	00	7 6
Grand Total	961	841	86 5	973	508	52	933	1339	69 3

LIST OF HOSPITALS

Following is a list of approved hospitals for 1924 up to October 1. The asterisk indicates that certain hospitals have accepted the requirements which result in the best scientific care of the patient but are not for the lack of time or other acceptable reasons carrying them out in every detail

ALABAMA

100 or more beds

Birmingham Baptist Hospital Birmingham
Employes Hospital T C I R R C Birmingham
Hillman Hospital Birmingham
Mobile City Hospital Mobile
Moody Hospital Dotham
Norwood Hospital Birmingham
Providence Infirmary, Mobile
St Vincent's Hospital Birmingham
South Highlands Infirmary Birmingham

50 to 100 beds

Alabama Baptist Hospital Selma
Children's Hospital Birmingham
Frazier Hospital Dotham
John A Andrew Memorial Hospital Tuskegee
Vaughan Memorial Hospital Selma
Walker County Hospital Jasper

35 to 50 beds

Sylacauga Infirmary Sylacauga

ARIZONA

100 or more beds

Arizona Deaconess Hospital Phoenix
St Joseph's Hospital Phoenix

50 to 100 beds

Arizona Hospital and Sanatorium Tucson
St Mary's Hospital and Sanitarium Tucson

35 to 50 beds

Miami Proctor Hospital Miami

ARKANSAS

100 or more beds

Logan H Roots City Memorial Hospital Little Rock
St Bernard's Hospital Jonesboro
St. Louis Southwestern R R Hospital Texarkana
St Vincent's Infirmary Little Rock
Spanks Memorial Hospital Fort Smith

50 to 100 beds

Baptist Hospital Little Rock
Fayetteville City Hospital Fayetteville
Leo N Levi Memorial Hospital Hot Springs
Michael Mager Memorial Hospital Texarkana
St. John's Hospital Fort Smith
St. Luke's Hospital and Annex Little Rock

35 to 50 beds

Helena Hospital Helena

CALIFORNIA

100 or more beds

Alameda County Hospital San Leandro
Angelus Hospital Association Los Angeles
California Lutheran Hospital Los Angeles
Children's Hospital Los Angeles
Fabiola Hospital Oakland
Franklin Hospital San Francisco
French Hospital San Francisco
General Hospital Fresno
General Hospital Santa Barbara
Glendale Sanitarium and Hospital Glendale
Golden State Hospital Los Angeles
Hahnemann Hospital San Francisco
Hollywood Hospital Hollywood
Hospital for Children San Francisco
Hospital of the Good Samaritan Los Angeles
Kern General Hospital Bakersfield
Loma Linda Sanitarium and Hospital Loma Linda
Los Angeles General Hospital Los Angeles
Mary's Help Hospital San Francisco
Methodist Hospital Los Angeles
Mt Zion Hospital San Francisco
O'Connor Sanitarium San Jose
Orange County Hospital Orange
Paradise Valley Hospital National City
Pasadena Hospital Pasadena
Providence Hospital Oakland
Sacramento Hospital Sacramento
St Francis Hospital San Francisco
St Francis Hospital Santa Barbara
St Helen's Sanitarium Sanitarium
St Joseph's Hospital San Diego
St Joseph Hospital San Francisco
St Luke's Hospital San Francisco
St Mary's Hospital San Francisco
St Vincent's Hospital Los Angeles
Samuel Merritt Hospital Oakland
San Bernardino County Hospital San Bernardino
San Diego County Hospital San Diego
San Francisco Hospital San Francisco
San Joaquin General Hospital French Camp
Santa Barbara Cottage Hospital Santa Barbara
Santa Clara County Hospital San Jose
Santa Fe Coast Lines Hospital Los Angeles
Seaside Hospital Long Beach
Southern Pacific Hospital San Francisco
Stanford University and Lane Hospitals San Francisco
University of California Hospital San Francisco
White Memorial Hospital Los Angeles

50 to 100 beds

Clara Barton Hospital Los Angeles
Community Hospital San Mateo
Kaspare Cohn Hospital Los Angeles
Mercy Hospital Bakersfield
Mills Memorial Hospital San Mateo
Murphy Memorial Hospital Whittier
Orthopædic Hospital Los Angeles
Ramona and Sequoia Hospitals San Bernardino
Shriners Orthopedic Hospital San Francisco
St Mary's Long Beach Hospital Long Beach
Woodland Sanitarium Woodland

35 to 50 beds

Baby's Hospital Oakland
Palo Alto Hospital Palo Alto

COLORADO

100 or more beds

Beth El Hospital Colorado Springs
Boulder Colorado Sanitarium Boulder
Children's Hospital Denver
Denver General Hospital Denver
Glockner General Hospital Colorado Springs
Mercy Hospital Denver
Minnequa Hospital Pueblo
St. Anthony's Hospital Denver
St. Francis Hospital Colorado Springs
St. Joseph's Hospital Denver
St. Luke's Hospital Denver
St. Mary's Hospital Pueblo

50 to 100 beds

Beth Israel Hospital Denver
Community Hospital Boulder
Denver and Rio Grande Western R. R. Hospital Salida
Red Cross Hospital Salida

35 to 50 beds

Atchison Topeka and Santa Fe R. R. Hospital La Junta
Parkview Hospital Pueblo

CONNECTICUT

100 or more beds

Bridgeport Hospital Bridgeport
Danbury Hospital Danbury
Grace Hospital New Haven
Greenwich Hospital Greenwich
Hartford Hospital Hartford
Hospital of St. Raphael New Haven
Lawrence and Memorial Associated Hospitals New London
Meriden Hospital, Meriden
Middlesex Hospital Middletown
New Britain Hospital New Britain
New Haven Hospital New Haven
St. Francis Hospital Hartford
St. Mary's Hospital Waterbury
St. Vincent's Hospital Bridgeport
Stamford Hospital Stamford
Waterbury Hospital Waterbury

50 to 100 beds

Charlotte Hungerford Hospital Torrington
Manchester Memorial Hospital South Manchester
Mt. Sinai Hospital Hartford
Municipal Hospital Hartford

DELAWARE

100 or more beds

Delaware Hospital Wilmington

50 to 100 beds

Homeopathic Hospital Wilmington

DISTRICT OF COLUMBIA

100 or more beds

Central Dispensary and Emergency Hospital Washington
Children's Hospital Washington
Columbia Hospital for Women Washington
Freedmen's Hospital, Washington
Gallinger Municipal Hospital Washington
Garfield Memorial Hospital Washington
George Washington University Hospital, Washington
Georgetown University Hospital Washington
Providence Hospital Washington
Washington Sanitarium Washington

FLORIDA

100 or more bed

Duval County Hospital Jacksonville
Miami City Hospital Miami
St. Luke's Hospital Jacksonville

50 to 100 beds

East Coast Hospital St. Augustine
Faith Hospital St. Petersburg
Gordon Keller Memorial Hospital Tampa

35 to 50 bed

Bayside Hospital Tampa
Riverside Hospital Jacksonville

GEORGIA

100 more beds

Davis-Fischer Hospital Atlanta
Georgia Baptist Hospital Atlanta
Grady Memorial Hospital Atlanta
Habersham Hospital Rome
Piedmont Sanitarium Atlanta
Rawlings Sanitarium Sandersville
St. Joseph's Infirmary Atlanta
University Hospital Augusta
Wesley Memorial Hospital Atlanta

50 to 100 beds

Athens General Hospital Athens
Atlantic Coast Lines Hospital Waycross
Downey Hospital Gainesville
Dawson Hospital LaGrange
Scottish Rite Hospital Decatur
Thomasville City Hospital Thomasville
Wilkinson Hospital Augusta
Wise Sanitarium Plains

IDAHO

100 or more bed

St. Alphonsus Hospital Boise

50 to 100 beds

Latter Day Saints Hospital, Idaho Falls
Pocatello General Hospital Pocatello
Providence Hospital, Wallace
St. Anthony's Hospital Pocatello
St. Joseph's Hospital Lewiston
St. Luke's Hospital Boise

ILLINOIS

100 or more beds

Augustana Hospital Chicago
Chicago Lying-in Hospital Chicago
Chicago Memorial Hospital Chicago
Children's Memorial Hospital Chicago
Columbus Hospital Chicago
Cook County Hospital Chicago
Emergency Hospital Kankakee
Evanston Hospital Evanston
Frances E. Willard Hospital Chicago
Garfield Park Hospital Chicago
Grant Hospital Chicago

Hinsdale Sanitarium Hinsdale
Hospital of St Anthony de Padua Chicago
Illinois Central Hospital Chicago
Illino Eye and Ear Infirmary Chicago
John B Murphy Hosp tal Chicago
Lake View Hospital Dan ville
Lutheran Deaconess Ho p tal Chicago
Lutheran Memor l Hospital Chicago
Mercy H pital Chicago
Michael Reese Ho p tal Chicago
Misericord a Hospital Chicago
Mt S nai Ho pital Chicago
Oak Park Ho pital Oak Park
Presbyterian Hospital Chicago
Rave s ood Hosp tal Chicago
Rockford Ho pital Rockford
St Anne s Ho pital Chicag
St Anthony Hospital Rock Island
St. Bernard s Hosp tal Chicago
St. Elizabeth Hospital Chicag
St Elizabeth H pital Dan ille
St Fra cis H pit l Blue I land
St Francis H pital E anston
St Francis H spital Peoria
St Joseph s H pital Ch cago
St Jo eph s Hospital Joliet
St Luke s Hosp tal, Chicag
St Mary Hosp tal Cai o
St Mary s H pital East St Lou s
St M ry s Hosp tal Quincy
St. M ry of Nazareth H spital Chicag
Silver Cros H sp tal Jol et
South Sh re Hospital Chic go
Swedish Co ena t Hosp tal Chicago
Uni ersity Hospital Ch cag
Wesley Memorial H pital Chicago

50 to 100 b ds

Bless ng Hospital Quincy
Highland Pa k H p tal H ghla d Park
H ber Memorial Ho p tal P a
Illinois Maso ic Ho pital Chicago
Ingalls M mori l Hospital Harvey
Ke n e Public H sp tal Kewa ee
Lake V ew Ho p tal Chicago
Luthera Ho p tal Moline
Mol ne Public Hospital Moline
No th Chi ago Hosp tal Chicago
Olney Sanitarium Olney
Our Savior's Hosp tal Jacksonville
Passa ant Memorial Hospital Chicago
Passa a t Memorial Hosp tal Jackso ille
Post Graduat Ho p tal Chicago
Provident Hospital Chicago
St And ew Hosp tal Murphysb
St Francis Hosp tal Freepo t
St Francis H sp tal Kewa e
Washington Boul v rd H sp tal Chicago

35 to 50 beds

Streeter Hospital Chicago

INDIANA

100 or m e b ds

Fort Wayne Luth ran H sp tal Fo t Wayn
Gary Hospital G ry
Indianapolis C ty Ho p t l I d a poli
Method t Episcopal H p tal I dia poli
Methodist Hosp tal G ry
Protestant Deaconess Hospital Evansville
Robert W Long Hospital India apolis
St Anthony s Hospital Terre Haute
St Edward s Hospital New Albany
St Elizabeth s Hospital LaFayette
St Joseph s Hosp tal Ft Wayne
St Joseph s H pital Mishawaka
St Joseph s Hospital South Be d
St Margar t s Hospital Hammond
St Mary s Hospital Evansville
St Mary s Me cy Hospital Gary
St Vincent s Ho pital Indi napolis
Union Hospital Terre Haute

50 to 100 beds

Epworth Hospital South Bend
Gra t County Ho pital Marion
Holy Family Hosp tal LaPo te
LaFayette Home Hosp tal L Fayette
Muncie Home Hospital Muncie
Reid Memorial Hosp tal Richmond
St John s Hosp tal Anderson
St Joseph s H pital Logansport
Wabash Valley Sanitarium and Ho p tal LaFayette
Walker Hospit l Evansville

35 to 50 b ds

Hayden Hospital Evansville

IOWA

100 or m e b ds

Finley Hospital D buque
Iowa Lutheran H pital Des M nes
Iowa M thodist H pital Des Moi es
Jenn e Edmundson Hosp tal Co ncil Bluffs
M cy Ho pital Cedar Rapid
Me cy H p tal C uncil Bluffs
Mercy Hosp tal Dav p t
Mercy Hospital Des Moines
Me cy Hospit l I wa City
St Joseph s H pit l D buq e
St J ph Me cy Hosp tal Si ux City
St Vin ent H sp tal Sioux City
U ers ty Ho pital Iowa City

50 to 100 b ds

Des Moines C ty Hosp tal Des Mo es
Iowa Congr gat onal Hosp tal Des Moines
I w State College Hosp tal Ames
Jane Lamb M morial Ho pital Clinton
L theran H sp tal Si ux City
M thodist Hosp tal Si ux City
Ottumwa Ho p tal Ottumwa
Pa k Hospit l Mason City
St F ancis H pital Wate loo
St Joseph H pital Keokuk
St J seph s Mercy Hospital Clinton
St Joseph Mercy Hosp tal Ft Dodge
St J seph s Mercy Hosp tal Mason City
St Joseph s M cy Hospital W erly
St Luke s H pital C dar Rapids

35 to 50 bed

D e port Ho pital Davenpo t

KANSAS

100 o mo e beds

Beth ny Methodist Hosp tal Kansas C ty
St Fr ncis Hosp tal Wichita

St. Margaret s Hospital Kansas City
Santa Fe Hosp tal Topeka
Wesley Hospital Wichita
Wichita Hosp tal Wichita

50 to 100 beds

Axtell Hosp t l Newton
Bell Memorial Ho p tal Kansas City
Bethel Deaco es Ho pital Newton
Christ Ho pital Topeka
Grace Hosp tal Hutch nson
Halstead Ho pital Hal tead
Missouri Kan as a d Te s R R Hosp tal Parsons
Mount Carmel Hospital P ttsburg
Pro dence Ho p tal Kan as City
St Anthony s Hospital Hays
St Anth ny s Murdock Mem rial Hosp tal Sabetha
St Elizabeth s Hospital H tchinson
St Fran is Ho pital T peka
St John s Ho p tal Sal na
St Jo eph s Hospital C ncordia
St Mary s Hosp tal Winfi ld
St R s s Hospital Great Bend

35 to 50 beds

St Luke s Hospital El Dorado

KENTUCKY

100 m e bed

Good S maritan H p tal Lexi gton
Lou s ille C ty Hospital Lou s ille
Norton Mem rı l H p tal Lo ı ille
St. Anthony s Hosp tal Lo isville
St Elizabeth s H spital Covington
St J seph s Ho pital Lexingt n
St J seph s Infirmary Lou s ıll
Sts Elizabeth and Mary Hospital Louisville

50 to 100 b ds

Ashland General Hospital Ashl d
Booth Memor l Ho p tal Co ington
Children s F ee Ho p tal Louisville
Jewish Ho pital Lo isv lle
Illino Central Hospit l Paduc h
Ki g s Daughters Hospital Ashland
M thod t Episcop l Hosp tal Lou sville
Speers Memorial Hosp tal Dayt n
Wm M son Memorial Hosp tal Murray

35 to 50 beds

Robinson Ho pital Berea

LOUISIANA

100 or mor b d

Charity Hospital New O l ns
Charity Hosp tal Shre eport
H tel Dieu t ew Or eans
P esbyterian Hosp tal New Orleans
St Francis Sa tarium Monroe
T E Schumpe t Mem l Hosp tal Shre eport
Touro I firmary New Orlean

50 to 100 b ds

Bapti t Ho pital Al andria
Eye Ea Nose a d Th oat Hosp tal New Orl s
Flint Goodridge H sp t l New Orlears
Highla d Sanitarium Shre port
Illinois C ntral R. R. Hosp tal New Orlea s
North Lo is na Sanitarium Shreveport
St Patrick s Sanitarium Lake Charles
Shriner s Hospital f r Crippled Children Shre eport

35 t 50 beds

New Orleans Dispensary for Women and Children New Orleans

MAINE

100 o more b d

Central Maine G neral H pital Lewisto
E st rn Mai e Ge eral Hosp tal B ngor
Ma ne Ey e a d E r I firmary Portla d
Ma e General Hosp tal Portland
St Mary s General Hospital, Lewiston

50 to 100 b ds

B th City Hosp tal B th
Children's Hospital P rtland
St Barnab s H pital Portla d
State Street Hospital Portl nd

MARYLAND

100 or mor b ds

Allegany Hospital C mberland
B y V w C ty H pital B ltim re
Chu h H me a d Infirmary Baltimore
Colonial Hospital Baltim r
Franklin Squa e Ho pital Baltimo e
Heb ew H p tal and Asylum Baltimore
H sp tal fo W men of Maryla d Baltimore
Johns Hopki s Hospital Baltimore
Maryl nd General Hospital Baltimo e
Mer y Ho pital Baltim re
Peninsula General H sp tal Salisbury
St Agnes Hospital Baltimore
St Joseph s Hosp tal Baltim e
Union Memorial Hospital Baltimo e
Uni ers ty H pital B ltimore

50 to 100 beds

C mbridge Maryland Hosp tal Cambridge
Children s Hosp tal School Baltimore
Emerge cy Hosp tal Easton
Fred rick City Hosp tal Frederick
James Lawre ce Kerna Hospital Balim re
South Balt more H p tal Baltim re
Western M ryland Hospital Cumbe land

35 to 50 bed

H ward A Kell y Hospital Baltim
Volunteers of Am rica Hospital Baltimo e

MASSACHUSETTS

100 or mor beds

B ve ly H p tal Beverly
Boston City Hospital Bosto
B ston Lying in Hospital Bosto
B ockton Hosp tal Brockton
B rb nk Ho p tal Fitchb rg
Cambridge C ty Hosp tal Cambridge
Cambridge H spital Cambridge
Carn y Hosp tal Boston
Child en s H pital Boston
C ty Hospital F ll R er
Cooley D ckinson Ho p tal N thampton
Fr e H sp tal f r Wom n Bost n
Gale Hosp tal Ha erhill

He ry Heywood Memorial Hospital Gardiner
Holyoke City Hospital Holyoke
Ho se of Mercy Hospital Pittsfield
Lawrence General Hosp tal Lawrence
Long Island Ho pital Boston
Lowell Corporation Hospital Lowell
Lowell General Ho pital Lowell
Lynn Hospital Lynn
M lden Hospital Mald n
Massachusetts Charitable Eye and Ear Hospital Boston
Massachusetts General Ho pital Bost n
Massachusetts Homeopath c Hospital Boston
Memorial Ho p tal Worcester
Mercy Hosp tal Springfield
New E gland Deac ness Hosp tal Bosto
New E gla d Hosp tal for Women and Child en Bo ton
Newton Hospit l Newton Lower Falls
Noble Hosp tal Westfield
Peter Bent Brigham Hospital Boston
Provide ce Ho pital Holyoke
Robert Breck Brigham Ho pital Boston
St El zabeth s Ho pital Boston
St John s H sp tal Lowell
St Luke s Hosp tal B dfo d
St. Vincent s Hospital W orcester
Sal m Hospital Salem
Springfi ld Hospital Springfield
Truesd le Hospital Fall Ri er
U on Hosp tal Fall Ri er
Waltham Hosp tal Waltham
Worcester City Hospital W orcester

50 to 100 beds

Anna Jaq e Hospital Newburyport
Beth Israel Hosp tal Bost n
Charles Choate Memorial Hosp tal Wob rn
Ch lsea Memorial Ho pital Chelsea
City Hospital Q i cy
Clinton H spital Cl nton
Em rson Hospital Boston
Farren Memorial Hospital Montague C ty
Faulkner Ho p tal Bo ton
Godd rd Hospital Brockton
Hale Ho pital Haverhill
Hart Pn ate Hospital Roxbury
House of the Good Samaritan Boston
Infant s Hospital Boston
Josiah B Thomas Hospital Peabody
M lrose Hospital Melrose
North Adams Hosp tal No th Adams
Somerville Hosp tal Somerville
Sturdy Memorial Hospital Attleboro
Symmes Arlington Ho pital Arl ngton

35 to 50 beds

New England Deaconess Hosp tal Bo to

MICHIGAN

100 or mo e b ds

B ttle Creek Sanitarium B ttle Creek
Blodgett Memorial H spital Gra d Rapids
Butt rworth Hospital Grand R p ds
Children s Free Hospital Detroit
Detro t Rece ving Ho p tal Detroit
Evang lical Deaco ess Hosp tal D troit
Grace Hospital D tro t
Edward W Sparrow Hosp tal La si g
Harper Hosp tal Detro t
Hackley Hosp tal Muskegon
Henry Ford Hospital Detroit
Highland Park General Hospital Highla d Park
House of Providence Detr it
Hurley Hosp tal Flint
Mercy Hospital M skegon
N w Bo gess Hospital Kalam zoo
Old Bo gess Hospital Kalamazoo
St Joseph s Ho pital Ann Arbor
St Mary s Hosp tal Grand R pids
St Mary s Hosp tal D troit
S ginaw Gener l Hosp tal Saginaw
Univ rs ty H spital Ann A bor
W A Foot Memor l Hosp tal Jackson
W men s Hospital and Infant s Home Detro t

50 to 100 beds

Bronson Hospit l Kalama o
Delray Indu t ial Hospital Det oit
Detro t Eye nd Ear Hospital Detroit
J fferson Clinic Hospital Detroit
Memorial Hospital Ow sso
M rcy H pital Cadillac
M rcy H pital Jackson
St Fran is Hosp tal Escanaba
St Joseph s Hosp tal Hancock
St Joseph s Ho p tal Detro t
St Jos ph s Hospital Mt Clemens
St Mary s Hosp tal M rquette
St Mary Ho p tal S ginaw
Woman' Hosp t l Saginaw

35 to 50 beds

I hpeming Hosp tal Ishpeming

MINNESOTA

100 o mo e b ds

Abbott Hosp tal Minneapol s
Ancker Hosp tal St Paul
Asbury Hospital Minneapolis
Bethesda Hospital St Paul
Cha les T Miller Hosp tal St Paul
Colom l Ho p tal Rochester
De coness Hosp tal M eapolis
Eitel Ho p tal Minne pol s
Fairview H pital Minneapol s
K hler Hosp tal Rochester
M nneapolis Ge eral H pital Minneapolis
Minnesota State Hosp tal for Ind gent Children St Paul
Mounds Park Sanitarium St Paul
No thern Pacifi Be eficial Associat on Hospital St Paul
Northwestern H pital Minneapolis
St Barn bas Hosp tal Minne polis
St J seph Hosp tal St P ul
St Luk s Ho pital Duluth
St L ke s Hosp tal St Paul
St Mary s Hospital Dul th
St M ry s Hosp tal, Min eapolis
St Mary Hosp tal Rochester
St P l H pital St. Paul
Sw dish Hosp tal Minne pol
Uni ers ty f M nesota Hospital Minneapolis
Worrell Hosp tal Rochester

50 to 100 beds

Hill Crest S rgical Hospital Minneapolis
Imma uel Hospital M nkato
St C bri l s Hospital Little Falls
St J hn Hosp tal St P ul
St Joseph s H sp tal Brai erd

St Joseph s Hospital Mankato
St Luke s Hospital F gus F ll
St Rapha l s Ho p t l St Cl d
Shriners Hosp tal for C ppl d Ch ldren M nne polis
Warren G neral H pital W rren
Winona Ge eral Hosp tal W ona

35 t 50 beds

Morgan Park H pital Dul th

MISSISSIPPI

100 or more b ds

Kings D ughters H sp tal Gulfport
Matty Herse Hosp tal Meridia
M ssis ppi State Charity H pital J cks n
South M ssiss ppi Charity H p tal La rel

50 to 100 bed

J cks n Infirmary J ckso
Miss ss ppi B ptist H p tal J ckson
Vicksburg Infirmary Vick b rg

35 to 50 b d

Dr Hairston s Ho p tal Merid a
J Z George Memorial Hosp tal A a d M College
H ust n H p tal Houst n
South Mi sipp Ge ral Hospital Hatt esbu g
Wi na Infirm ry W n

MISSOURI

100 o m e b d

Alexian Brothers H p tal St. Lo is
Barnes Ho pital St Lou s
Bethesda Hospital St Loui
Children s H p tal Kansa City
Christian Church Hosp tal Kansas City
Eva gelical D aconе s Home nd H spital St Louis
Grace Hospital Kansas C ty
F sco Employees H pital St Lo is
Jewi h Ho p tal St Louis
Ka sas City Ge ral Hosp tal Ka sas City
Luthera Hosp tal St Lou
Missouri Baptist Sanitarium St Louis
Mis uri Pacific R R Ho pital St Lou s
Old Ge eral H sp tal Kansas C ty
Research Hospital Ka sas C ty
St Anthony's Hospital St Louis
St J hn s Hospital St Louis
St. Joseph Ho p tal, Ka sas C ty
St Louis Child e s H p tal St Louis
St Louis C ty H spit l St Lo is
St Lo is City Hosp t l N 2 St Louis
St Louis Mull nphy Hosp tal St Louis
St L ke s H pital Ka sas C ty
St Luke s Hospital St Lo s
St. Mary I firmary St. Lo is
St Mary s H sp tal Ka s s City

5 to 100 bed

Boone County Hosp tal Columbia
Frisco Empl y es H p tal Springfield
I d pende c Sanitarium Indep d nc
P rk Mem rial H p tal C lumbia
St. F cis H pital Cape G rard
St Franci H pital M ryville
St. J hn s Hosp tal J plin
St Louis B ptist Hosp tal St Louis
St. Mary s Hospital Jeff rson City
Trinity Lutheran Hospital Kansas City

35 to 50 beds

Barna d F ee Skin a d Cance Hospital St Louis
St Lou s Maternity Hospital St Louis
Wheatley Prov dent Ho p tal Kansas City

MONTANA

100 or more beds

Col mb s Hospital Gre t Falls
Holy Rosary Hospital M les C ty
M tana Deaconess Hosp tal Great Falls
Murray H pital Butte
St J me H sp tal Butte
St Pat ck H sp tal M sso la
St Vince t s Hospital Billings

50 to 100 beds

Northern Pacifi Be ficial Association Hosp tal Glendi e
Northern Pacific B neficial Association Hospital Missoula
St Ann s H sp tal Anacond
St John s Hosp tal H le a
St Joseph Hosp tal Lewistown

NEBRASKA

100 o more beds

Bishop Clarkson Memorial Hosp tal Omaha
Nebraska M thodist Episc pal H p tal Omaha
Nebraska O thopedic H pital Lin oln
St Elizabeth s Hospital Lincoln
St Fra cis H p tal Gra d I land
St J eph s Ho p tal Omah
St M ry Ho p t l Columbus
Uni ersity of Nebrask Hosp tal Omaha

50 to 100 beds

Imm uel H pital Omaha
St Joseph Ho p tal Alli ce
Swedish Missi n Hosp tal Omaha
Wise Memorial Hospital Omaha

NEVADA

50 to 00 bed

Elk Gen ral Hosp tal Elko
St Mary's Hosp tal R o

35 t 50 beds

Steptoe Valley Hospital East Ely

NEW HAMPSHIRE

100 or more b ds

St Joseph Hospital Nashua

50 to 100 bed

Cla em nt Ho pital Cl emont
Elliott Community Hosp tal Keen
Elli tt Hosp tal Ma chester
Laconia Hosp tal Lac n a
Marga t Pillsb ry General Hosp tal Concord
Mary Hitchcock Memorial Hosp tal Hano
Nash Memo tal H sp t l Nash a
Notre D me Hospital anchester
Portsmo th H sp tal P tsm th
Sacred Heart Ho p tal Manchest r

NEW JERSEY

100 or more beds

Alexian Brothers Ho pital Elizabeth
All Souls Hosp tal Morristown
Atlantic City Hospital Atlantic City
B yonne Hospital and Dispensary Bayonne
Christ Hospital Jersey City
Cooper Hospital Camden
Elizabeth General Hospital Elizabeth
Engl wood Hospital E glewood
Hack sack Hospital Hackensack
Jersey C ty Hospital Jersey City
Mercer Hospital Trenton
Monmouth Memorial Hospital Long Branch
Morristown Memori l Hospital Morristown
Mo ntainside Ho p tal Montclair
Muhlenberg Hosp tal Plainfield
New k B th Israel Ho pital Newark
Newa k City Hosp tal Ne ark
Newa k Memorial Hospital N wark
Newark Presbyterian Hospital Newark
Ora ge Mem rial Hospital Newark
Passaic General Hosp tal Passa c
Paterson General Hosp tal P t rson
Perth Amboy C ty Hosp tal P th Amboy
St Barnabas Hosp tal Newark
St Elizabeth s H pital Elizabeth
St Francis Hospital Jersey City
St Francis Ho pital Tre ton
St. James Hosp tal Newark
St J seph Hospital Paterson
St Ge ard s Italian Hosp tal Newark
St Mary's H pital Hoboken
St Mary's Hospital Ora ge
St M ry s Ho p tal Passa c
St Mi hael s Hosp tal Newark
St P ter s Ge eral Hosp tal New Brunswick
West Jersey Homeopathic Ho p tal Camden

50 to 100 b ds

Ann M y Memorial Hospital Spring Lak
Homeop thic Ho pital Newark
H sp tal fo Wom n a d Children Newa k
Maram a d Nathan Barnert Memorial H sp tal P te son
Middlesex G neral Hosp tal New Brunswick
Newcomb Hospital Vinel nd
Newa k Eye a d E r Infirmary N wark
North H dson H p tal We hawken
Ove look Hospital Summitt
William McKinl y Memorial Hosp tal T enton

35 t 50 beds

Burlington County Hosp tal Mt Holly

NEW MEXICO

50 to 100 beds

St J seph s Hosp tal Albuqu rque
St Mary Ho p tal G llup
St. M ry s Hospital R swell
St Vin ent s Hospital S nta Fe

NEW YORK

100 or more b d

Albany H spital Albany
Arnot-Ogden Memorial Hosp tal Elmira
Auburn C ty Hospital Auburn
Bellevue Hospital New York City
Beth Da id Ho pital New York City
Beth Israel Hospital New York C ty
Beth Moses Ho p tal Brooklyn
Bi ghamton Ho p tal B nghamton
Bro d Street Ho pital New York City
Bronx Hospital New York City
Brooklyn Hosp tal Brooklyn
Brown ville a d East New York Hospital Brooklyn
Buff lo City Ho pital Buffalo
Buff lo General Hospital Buffalo
Buffalo Ho pital of Sisters of Cha ty Buffalo
Bushwick Hospital B ooklyn
Carson C Peck Memorial H pital Brooklyn
Child en s Hosp tal Buffalo
Columbus E tens on Ho pital New Yo k C ty
Comm n ty Hosp tal New York City
Coney Isla d Ho pital Brooklyn
Crou e Irvi g Hospital Syracuse
Cumberland Street Hospital B ooklyn
Deaconess Home and H sp tal B ff lo
Ellis Hospital Schenectady
Faxton Ho pital Utica
Fifth Avenue Hospital N w York City
Flower Hospital New York City
Flushing Hospital and D p sary Flu hing
Fordham Ho pital New Yo k City
French Bene olent Society Ho pital N w York City
Gou erneur Hospital New York City
G as l nds Hospital Valh ll
G e po t Hospital Brooklyn
Ha l m Ho p tal New York City
H ghla d H p tal Rochester
Ho pital f th Good Shepherd Syracus
Holy Family H p t l Brooklyn
House of Good Samaritan Wate t wn
Ho p tal for Deformit s and Joi t Diseases New Y rk C ty
Ithaca C ty Hosp tal Ithaca
Jewish Hospital B ooklyn
Jewish M ternity H p tal New York C ty
Jewi h M morial Hosp tal Ne v York C ty
King s C u ty Hospital B oklyn
Knickerbocker H p tal N w York City
Lawr e Hosp tal Bro x lle
Lebanon H p t l New Yo k C ty
Leno H ll Hospital New Yo k C ty
Li c l Ho p tal New York City
Long Isla d Coll ge H sp t l Brooklyn
Luth ra Hosp tal f Ma h ttan New Yo k C ty
Manhattan Eye nd E H p tal New Y k City
M ry Imog ne Ba sett Hospital Coopersto n
Memorial Ho p tal for C nce a d Alli d Dise ses N w York C ty
Memorial H sp tal Alba y
M thod st Ep pal H spital B ooklyn
Metropol tan Hosp t l New York City
Millard F llm re Hosp tal Buff lo
M seric rd a Hospital New York City
Mt St M ry Ho p tal Niag ra Falls
Mt S ai H p tal New Y k C ty
Mt Ve n Ho p tal Mt Ve non
M t flo e H p tal Ne Yo k C ty
N ssau H p tal Mi eola Lo g Isla d
New Roch lle H p tal N w Roch ll
New York C ty Hosp tal Blackwell s I land New York C ty
New Yo k Eye nd Ea I firmary New York C ty
New Y k F ndl ng Home New Yo k City
New York Hosp tal N w Yo k C ty

New York Infirmary for Women and Childr n New Yo k C ty
New York Nursery a d Children s Hospital New Yo k City
New Y rk Orth pedic H pit l New York City
New Yo k Orthopedic Hosp tal for Children West H rstraw
New Yo k P lclinic Ho p tal N w York C ty
New York Post Grad at Hosp tal New York C ty
New Y k Ho pit l for Ruptured nd Crippled New York C ty
New Y k Ski nd Cance H p tal N w York City
N agara Falls Memorial Hosp tal Niagara Falls
No egian Luth ran Deac nes Ho p t l B ooklyn
Olean Ge eral H pit l Ole n
O da County Ho pital Rom
P rk Av nue Cl cal Hosp tal Rochester
P esbyt n n Ho p tal New York C ty
P o pect He ghts Hosp tal New Yo k City
Roche ter Gene l Ho pital Rochest
Rochester H meopathic Ho p tal Kochest
Roosevelt Ho p tal New York City
Sail rs S g Harbor Hosp tal New Brighton
St Catherine s Hosp tal B ooklyn
St Elizabeth s H spit l a d H m Utica
St Francis Hosp tal New York City
St J hn s Brooklyn H p tal Brooklyn
St John s Hospit l Long I land
St John s Ri rs i Hosp t l Yo kers
St Joseph s Ho p tal Syracuse
St Luke s Hosp tal N w Y rk City
St L ke s Ho p t l N wburgh
St Luke s Hospital Utica
St Mark s H pital N York C ty
St. Mary s M te nity H pital Buffalo
St Mary s Free H pital f r Childre New York City
St Mary s Hosp tal B ooklyn
St Mary s Hosp tal Rochest r
St Peter s H sp tal Albany
St Pet s Hosp tal Brooklyn
St V ent s H spital N w York City
Samaritan Hospital Troy
Saratoga Hospital Sarat ga Spri g
Sl ne Ho pital for Women N w Y rk C ty
Sold rs a d Sa lors Memorial H p tal Ut ca
Stat n I l nd Ho p tal Tompki ille
Syr cu Memorial Hospital Syracuse
The Sa tarium Cl fton Springs
Troy Hosp tal Troy
U t d Ho pit l P rt Ch st
U ited I rael Zion Ho p tal Bro klyn
V ssar Brothers Ho pital Po ghkeep e
Whit Plai s *H spital* Wh te *Pl ins*
W m n s Ho p tal New York C ty
Wyckoff H ights H pital B ooklyn
Y nk rs Hom op thic Hosp tal d Maternity Home Y kers

5 to 100 b d

Ab e Hyde M m rial Hospit l Malo
Amst rdam City Ho p tal Amste dam
Anth ny B ady Hosp tal Alb ny
A elia Osborn F x M m rial H p tal Oneonta
B b es H spital New Y rk C ty
B kma Strect Hosp tal N w Yo k C ty
B thesd Ho p t l H rmel
B oad Street Hosp tal Oneida
B ooklyn Eye a d Ea Hospital Brooklyn
Champlain Vall y H sp t l, Plattsb g
City H p tal Kingston
Columbus Hosp tal N w Y k City
Dobbs Ferry Hosp tal D bbs Ferry
Emerge cy Hospital of Sisters of Ch rity B ffalo
General Hospital Syracuse
Geneva City H sp tal Ge v
Gl ns Falls Hosp tal Glens Falls
Harbor Ho pital Brooklyn
Hudson City Ho p tal Hudson
Italian B n olent Hosp tal New Y k C ty
Jamaica Hosp tal Jamaica
Leonard Hospital Troy
Manhattan Maternity Hospital New York C ty
Mary Immaculate Hosp tal Jamaica
M ry McClellan Hosp tal Cambridge
N than Littauer Hosp tal Glo ers ill
Neurol gical Institute New Y rk City
New York Ophthalmi Ho pital New Y rk City
Ossining Ho pital Ossini g
Peoples Hospital New York C ty
Rockefell r I stit te New Yo k C ty
Reconstruct on Hosp tal New Yo k C ty
Rome Hospital R me
St Bartholomew s Hospital N w York C ty
St Jo eph s H pital Y nkers
St M ry s H pital Am terdam
St Vincent s Hosp tal West N w Brighton
Southampton Hospital, Southampton
Swedish Hospital Brooklyn

35 to 50 bed

Lexi gton H p tal New Yo k City
Southside Hospital B yshore

NORTH CAROLINA

100 o m b d

Ashe ille Mission Ho p tal A he ill
Jam s W lker Memorial Ho pital Wilmington
Rex H sp tal Raleigh
St Leo s Hosp tal, Greensboro
Watts Hosp tal Durham

5 to 100 beds

Atlantic Coast Lines R. R Hospital R cky Mount
C ty Ho pital Winsto Salem
F ench Broad H p tal Asheville
Highpoi t H pital Highpoint
Highsmith Hosp tal Fayett ille
Lo g s b nitarium States ll
Ma tin Memorial H pital Mt Airy
M cy Ge ral Hosp tal Cha lotte
M r eth Hosp tal Ash ille
N th C lina O th ped Hosp tal G stoni
P kview Hospital Rocky Mou t
Pitt C mmunity Hosp tal Gree ille
P ttma Hosp tal F yettevll
Rutherford Hosp tal R th rfordton
Sal sbury Hospital Salisbury

35 to 50 beds

Biltm re H p tal Biltmore
Bull ck Hosp tal Wilmington
Cumbe la d Gen ral Hospital F yette ill
Edg comb Ge l H p tal Tarboro
Lawrence Hosp tal Win t Salem
More H ring Hosp tal Wilson
P rrott Memorial Hospital Winston
Richard B ker H sp tal Hickory
Wesl y Long Mem rial Hospital G een boro

NORTH DAKOTA

100 o more beds

Bismarck Eva gelical Deaconess Hospital B smarck
Grand Forks Deaconess Hospital Grand Forks
St Alexius Hospital Bismarck
St. John s H p tal F rgo
St Luke s Hospital Fargo

50 to 100 beds

St. Joseph s Hosp t l M not
St. Michael Ho p tal Grand F rks

OHIO

100 o m e beds

Allia ce H sp tal All nce
Aultman Hosp tal Canton
B thesda Ho pital Cincinn ti
Christ Hospital C ncinnati
Cincinnati Ge eral Hospital Cincinnat
City Hospital Akron
Cl veland City Hospital Cle ela d
Cl eland Mat rnity Hosp t l Cleveland
Gl nville Hosp t l Cle la d
Good Samar tan H spital C ncin ati
Good Samaritan Hospital Zanesv lle
G ant Hospital Columbus
Hawkes Hospital of Mt Carmel Col mbus
Huron Road Hosp tal Cle ela d
Jewish Hospital Cinc nnati
Lakes de Hospital Cle ela d
Lucas Cou ty H p tal T l do
Lutheran Ho p tal Cle ela d
Ma sill n City Ho pital Massillon
Mercy Hospital H milton
Mercy H spital T led
Miami Valley Hosp t l Dayton
Mt Sina Hosp tal Cle eland
Peoples Hosp tal Akr n
St Al xis H p tal Cle ela d
St Ann I fant Asylum and Mate nity Hospit l Cle eland
St Elizabeth s H pital Dayton
St Elizabeth Hospital Y ou gstown
St Fran Hospit l Columbu
St. John Ho pital Clevela d
St J seph Hosp tal Loraın
S Lu e H p tal Cle ela d
St. Mary s Hospital Cinc nnati
St Rita s Ho pital L m
St Vince t s Hospital Cl eland
St Vinc t s Ho p tal Toledo
Spri gfield C ty Hospital Sprin fi ld
Starling Loring Uni rsity Ho p tal Columbu
T led Hospital T ledo
Y gstown H spital Y ou gstown
White Cross Hosp tal Col mbu
Woman s Hospital Cl eland

50 to 100 b ds

B lla re C ty H sp tal Bellai e
Children s H sp tal Cincinnati
Children Ho pital Col mbus
Deaco s Hosp tal Cinci at
F rview Ho p tal Cl el nd
Fl w Hospital T ledo
Good S maritan Hosp tal S nd sky
Hosp tal Cl nic Compa y Cl la d
Lak wood Ho p tal Lake ood
Lima City Ho pital Lima
Mansfield General Ho pital Mansfield
Martin s Ferry Ho pital Martin Ferry
Mary Day Nurs ry and Ch ldren s Hospital Akron
M ternity a d Child n s Ho p tal Toledo
M morial Ho pital Fremo t
Mercy Ho pital Columbus
Mercy Hospital C nto
Ne rk City Ho p tal Newark
Ohio Vall y Ho pital Steuben ille
Robinwood Ho pital Toled
S lem Ho p tal Salem
Scharrman Ho p t l Portsmouth
Seton Ho pital Cincinnati
Warren City Hospital Warre

OKLAHOMA

10 or mo e beds

St Antho y s Hosp tal Okl homa City
State Uni ersity H pital Oklahoma City

50 to 100 bed

El Reno S nitarium El R no
Mornings de Ho p t l Tulsa
Wesley Ho pital Oklahoma City

35 to 50 bed

P nca City Hospital Ponca City

OREGON

100 or mo e b ds

Ema u l Hospit l P rtland
Good Sam ritan Hosp t l P tla d
Multnomah Cou ty H spital Portla d
P tl nd Sanitarium Po tl d
St V n ent s Hosp tal Po tland

50 to 100 b ds

Mercy Ho p tal E gene
Portla d Surgi l Hospital Po tl nd
Sa ed H rt H sp tal Medf rd
St M ry Ho pital Astor

PENNSYLVANIA

100 o mor bed

Ab gto Hosp t l Abi gton
Allegh ny General Hospital Pittsburgh
All ntown Ho p tal All ntown
Altoo H pital Altoon
B ddock Gen ral Ho pital Br dd ck
Bryn M wr Ho p tal Bryn M w
Chester County H p tal West Chester
Chest H pital Chest r
Che tnut Hill Ho pit l Philad lphia
Child en s Homeop th Hospital Phil delphia
Clea fi ld Hosp tal Cl arfi ld
C l mb Ho pit l P ttsb rgh
Conemaugh V lley Memorial H sp tal Johnst wn
East n Hosp tal East n
Elizabeth Steel Mage Ho p t l Pittsb rgh
F kf d Ho pital Philadelphia
Georg F Ge si g Hospit l Dan ille
G rmantown Dispensary d H sp tal Philadelphia
Hahn mann Hospital Scrant
Hah mann Medical d Surgical Hosp tal Philadelphia
Hamot Hospit l Er e
Ha n b rg Hosp tal H rrisburg

Hazleton State H pital Hazlet n
Homeopathic Medical and Surgical Ho p tal Pittsburgh
Hospital of the P testant Episc pal Church Philadelphia
Hospital of the Uni ersity of Pe nsyl ania Phil delphia
Hospital of the Women s Med cal College Philadelphia
J Lewis Cr z er Hospital Chester
Jefferson Hosp tal Philad lphia
Jewish Hosp tal Philad lph
Lancaste General Hosp t l Lancaster
Lankenau Hosp tal Philad lphia
Med co Chiru g cal Hospital Philadelpi a
Mem rial Hosp tal Ro bo o gh
Me cy Hosp tal Altoo a
Mercy H p tal Johnstown
M cy Hosp tal, Philadelphia
Mercy Hosp tal Pitt burgh
Mercy Hosp tal W lkes B rre
Method t Ep copal Hosp tal Philad lphia
Miserico d a Ho p tal Phil delphia
Mo es Taylor H pital Scranton
Mt Sinai H p tal Philadelphia
Pas a ant Ho p tal P ttsburgh
Pennsyl ania Hospital Phil delph a
Ph ladelphia Ge l H p tal Phil delphia
Philadelphia Polyclinic Ho p tal Philadelphia
Pitt burgh Hosp tal P ttsburgh
Potts lle Hosp tal Potts ll
Presbyterian Hosp tal Phil delphia
P esbytern n Hosp tal Pittsb rgh
Reading H p tal Reading
R bert P cker H pital S yre
S cred H art Hospital All t wn
St Agnes Hospital Philad lphia
St Fran is H pital P ttsbu gh
St J hn s G n ral Hospital Pittsb rgh
St Joseph s Hosp tal Lancaster
St Joseph s H p tal Ph lad lphia
St J seph s Hosp tal P ttsb rgh
St Jo eph s H p tal Read n
St J ph s Inf nt and Matern ty H pital Scra ton
St L ke s H spital South B thleh m
St Marga et s H p tal P ttsb rgh
St M ry s H p tal Phil delphi
St V nce t Ho p t l Erie
Samarita Hospital Philad lphia
Scr nt State Ho p tal Scra t n
South Side H p tal P ttsburgh
U ontown Hospital Unio t wn
W shi gt n H sp tal W ash gt n
West Philadelph a Ho p tal for W me Philad lphia
We t n Penn ylvan a H spital P ttsbu gh
Westmor la d Hosp tal G ee b rg
W lkes-B rr C ty H sp tal Wilkes B rre
Wills H p tal Ph l delphia
Wom s Homeopathic H p tal Philadelphi
W m n s H p tal Ph ladelphia
Y k Ho p tal and D spe sary York

50 to 100 b ds

Annie M W rner H p tal Gettysburg
Ba bridg Pri ate Hosp tal Philadelph
Be V ll v General Hosp tal New Brighton
Ca h l General H p t l Ca l le
Ch ldren s Ho pital Philad lphi
Child n s Ho p tal Pittsbu gh
C t e s General Ho pital N w Kens gto
Col mbi Hosp tal Colum bia
Cottage State H p tal Blos burg
D Bois Ho p tal DuBois
Ey a d Ear Hosp tal Pittsburgh
Frederick Douglass Memori l Hosp tal Philadelphia
Good Samaritan Hospital Leba on
Homeopathic Hosp tal We t Chest
Howard Ho pital Philad lphi
*India a Hospital Indiana
J C Blair Memorial Hosp tal Hu tingto
Jewish M ternity Hosp tal Phil delphia
Joseph Pric Memorial H pital Philad lph
Kane Summitt Hosp tal Kan
Lo k Ha en Hosp tal Lock Ha n
Montg mery H p tal N rri town
M ntefi e H pital P ttsburgh
New Castle Hosp tal New Castl
Oil City Ho p tal Oil C ty
Palme ton H pital Palmerton
Philad lphia Lyi g in Cha ity Hosp tal Philad lphia
P ttston Ho p tal Pittston
Polyclinic H pital H rrisb rg
Pro dence H spital Bea r F lls
St Luke s H meopathic H sp tal Philad lphia
St Vince t s Hosp tal Phil delph a
Sewickl y Vall y H spital, Sewickley
Sham kin H pital Shamok
Stat Hosp tal f Nant cok Nantic ke
St tson H pital Phil d lphia
S bu ban H pital Bell e
W ndber Hosp tal W dber

35 to 50 b d

Gr t Hea t Mat rnity Hosp t l Philadelphia
Le H meopath c Ho p tal J hnstown
West S d S tarium Phil delphia

RHODE ISLAND

00 o m beds

Newport Hospital Ne port
P o iden City H p tal P ovid ce
Rhode Isl nd H pit l P o ide e
St J eph s H pital Pro d ce

50 to 100 b ds

M morial Hospital P tuck t
Pro id e Lyi g n Hosp tal Provide

SOUTH CAROLINA

1 o mo b d

Flo nce I firm ry Flo e ce
Green lle C ty Ho p tal G ee ll
Roper Ho p tal Cha l t n
South Carolina Baptist Ho pit l C l mb

5 t 100 b d

And rson Co nty H p t l And rson
Bak r S t ri m Ch l ston
St Fra i Navi l firmary Cha lesto

35 t 50 bed

O a g b rg Hosp tal O g b rg

SOUTH DAKOT

100 o mo bed

Ch mbe la Sanitarium a d Hospital Chambe lain
McKe n Hosp t l S o Falls
Method t St te Hosp tal Mitchell
Sacred H a t H p tal Y nkton
St Luke H p tal Aberdeen

50 to 100 beds

Bartron Hosp tal Watertown
Lincoln Hospital Aberdeen
Luther Hospital Wate town
Methodist Deaco ess Hospital Rapid City
Moe Hosp tal Sioux Falls
New Madison Hospital Madison
Peabody Hospital Web ter
St Joseph s Hospital Deadwood
St Joseph s Hospital M tchell
St M ry's Hospital P erre

TENNESSEE

100 r m e b ds

B ptist Memorial Hosp tal M mphis
Erlanger Hosp tal Chattanoog
George W Hubbard Hospital Nash ille
Knoxvill Gene al Hosp tal K ox lle
Memphis General Ho pital Memphis
Nashville C ty Ho pital Nash ill
St J seph s Ho pit l Memph s
St. Th mas Hospital Nash ille
Vanderbilt Hosp tal N shville

50 to 100 beds

Appalachian Ho pital Joh son C ty
Baird Dulaney H sp tal Dyersburg
Lucy Brinkl y Ho pital M mphis
Millie E Hale Ho pital Na hv lle
N well a d Newell Sa itari m Chattanooga
Protestant Hosp tal Nash ille
R rsi le Hospital Knoxville
W man s H p tal of State of Tennessee Nash ill

35 to 50 b ds

Crippled Children s H p tal Memphis
D W C Campbell s Hosp tal, Mem hi

TEXAS

100 o m e b d

B y l r Hosp tal D llas
B ptist Hosp tal H ust n
Ce tral Texa B pti t Sanitarium W a o
H t l D u Beaumont
J hn Sealy Hospit l G l esto
Methodist Hosp tal H usto
P rkland Hosp tal D ll s
Provide e Sa itarium W co
R bert B Gree M mo al Hosp tal San A to io
St. Joseph Infirm ry I t Wo th
St Joseph s Infirm ry H ston
S M ry s I firm ry Cal t n
St Paul s Sa tarium D llas
Sa ta F Ho p tal Temple
Santa Rosa Infirmary S A ton o
Scott nd White Hosp tal Temple
Seton I firm ry Aust n
So t ern Pac fic Hosp tal H ton
W ch ta Ge eral Ho pital Wich ta Fall

50 to 100 beds

All Saints Hospital Ft W th
B ptist Hosp tal I t W rth
C ty nd County H spital Ft Worth
C ty and County Hosp tal H u t
Fra es A Luth Hosp tal Ora ge
H rris San tarium Ft W rth
Hella Temple H sp tal Dallas
Internat onal R R Hospital I alestin
King Daughters Hospital Temple
Lubbock Sanitarium I ubbock
Masonic Hosp tal El Paso
St Jo ph s H pital Paris
Sa ato ium of I ar s Pari
Sh rman Hospital Sherman
Spohn S nitari m Corp s Christi
Texark na S itarium T arkana
Te as and Pacific R R Hosp t l Marshall

35 to 50 beds

McKin y C ty H p tal McKi ney

UTAH

100 mor bed

Doctor W H G oves Latter Day Sai t s Hospital Salt Lake C ty
Holy Cr s Ho p tal S lt Lake City
St Mark s Ho p tal S lt Lake City
Salt Lake Cou ty H pital Salt Lake City
Thomas D D e Memorial Hosp tal Ogd n

50 to 100 b ds

Ut h Id ho H pital Logan

VERMONT

100 or mo e b ds

M ry Fl tch r Hosp tal B hington

50 t 100 b ds

I v All Hosp tal W noo ki
Heat n Ho p tal Montpelie
Rutla d Hosp t l P tl nd
St Alba H p tal St Alba

35 to 50 b ds

Brattl boro Mem r l Ho p tal Brattl boro

VIRGINIA

100 r more beds

Chesape ke d Oh o Hosp tal Cl fton Forge
H pital Di i n of Medi al College of Virgi ia R ch m d
N rf lk I r testa t Ho p tal No folk
R t e t f r the N ch Ri hm n l
St V cent H p t l N f lk
St rt C rcle H pit l Ri hm nd
Un rs ty f V rg nia H p tal Charl ttes ille

50 t 100 b ds

D n Hosp tal nd H mpt n Training School fo N rses Newport Ne s
Elizabeth Bu ton Hosp tal N wpo t News
Georg Ben J h t n Memorial Hosp t l Ab gd n
Cra e H p t l R chm nd
J ff rson Hosp tal R an ke
J hn t n W ll S tari m Richmond
Ki g s D ught rs Hosp tal St u t n
Ki g D ught rs Hosp t l Portsm th
Lake V ew Hospital S ff lk
Lew C le Hospit l Roa ke
Lyn hburg Hosp tal nd C ty Home Lyn hburg
Mt i Hosp t l N f lk
P rm h M m rial H sp tal P tsm uth
Ri rs I Hosp tal N wpo t N ws

Roanoke Hospital Roanoke
St Elizabeth's Hospital Richmond
St Luke's Hospital Richmond
Sarah Leigh Hospital Norfolk
Sheltering Arms Free Hospital Richmond
Shenandoah Hospital Roanoke
Tucker Sanitarium Richmond
Winchester Memorial Hospital Winchester

WASHINGTON

100 or more bed

Children's Orthopedic Hospital Seattle
Columbus Sanitarium Seattle
King County Hospital Seattle
Maria Beard Deaconess Hospital Spokane
Northern Pacific Hospital Tacoma
Providence Hospital Seattle
Sacred Heart Hospital Spokane
St Elizabeth's Hospital Yakima
St Joseph Hospital Tacoma
St Luke's Hospital Spokane
St Mary's Hospital Walla Walla
Seattle City Hospital Seattle
Seattle General Hospital Seattle
Swedish Hospital Seattle
Tacoma General Hospital Tacoma
Virginia Mason Hospital Seattle

50 to 100 bed

Everett General Hospital Everett
Mount Vernon Private Hospital Seattle
Providence Hospital Everett
St Anthony Hospital Wenatchee
St Joseph's Hospital Bellingham
St Joseph's Hospital Aberdeen
St Luke's Hospital Bellingham
St Luke's Hospital Seattle
Walla Walla Sanitarium College Place

WEST VIRGINIA

100 or more bed

Charleston General Hospital Charleston
Kessler Hartzfeld Hospital Huntington
Ohio Valley Hospital Wheeling
St Mary's Hospital Clarksburg
Williamson Hospital Williamson
Wheeling Hospital Wheeling

50 to 100 bed

Beckley Hospital Beckley
Bluefield Sanitarium Bluefield
Charleston Kanawha River Hospital
Clay Valley Hospital Montgomery
Cook Hospital Fairmont
Davis Memorial Hospital Elkins
Fairmont Hospital Fairmont
Guthrie Hospital Huntington
King Daughters Hospital Beckley
King Daughters Hospital Martinsburg
McKendree Hospital New Martinsville
St Joseph Hospital Parkersburg
St Luke Hospital Bluefield

WISCONSIN

100 or more bed

Columbia Hospital Milwaukee
Holy Family Hospital Manitowoc
LaCrosse Lutheran Hospital LaCrosse
Lutheran Hospital Eau Claire
Madison General Hospital Madison
Marquette University Hospital Milwaukee
Mercy Hospital Janesville
Milwaukee Children's Hospital Milwaukee
Milwaukee County Hospital Milwaukee
Milwaukee Hospital Milwaukee
Mt Sinai Hospital Milwaukee
St Agnes Hospital Fond du Lac
St Elizabeth's Hospital Appleton
St Francis Hospital LaCrosse
St Joseph's Hospital Marshfield
St Joseph's Hospital Milwaukee
St Mary Hospital Green Bay
St Mary's and Mercy Hospitals Oshkosh
St Mary Hospital Milwaukee
St Mary's Hospital Superior
St Mary's Hospital Wausau
Wisconsin State General Hospital Madison

5 to 100 bed

Evangelical Deaconess Hospital Milwaukee
Grandview Hospital LaCrosse
Hanover Hospital Milwaukee
LaCrosse Public Hospital LaCrosse
Milwaukee Infant Home and Hospital Milwaukee
Milwaukee Maternity Hospital Milwaukee
St Catherine Hospital Kenosha
St Joseph's Hospital Dodgeville
St Luke's Hospital Racine
St Mary's Hospital Madison
St Mary's Hospital Rhinelander

35 to 50 bed

Methodist Hospital Madison

WYOMING

5 to 100 bed

Cheyenne Hospital Cheyenne
Natrona County Hospital Casper
Wheatland Hospital Wheatland

CANADA

ALBERTA

100 or more bed

Edmonton General Hospital Edmonton
General Hospital Calgary
Holy Cross Hospital Calgary
Medicine Hat Hospital Medicine Hat
Memorial Hospital Edmonton
Royal Alexandra Hospital Edmonton
University of Alberta Hospital Edmonton

50 to 100 bed

Brett Hospital Banff
Galt Hospital Lethbridge
Lamont Public Hospital Lamont
Municipal Hospital Drumheller

BRITISH COLUMBIA

100 or more bed

Provincial Royal Jubilee Hospital Victoria
Royal Columbia Hospital New Westminster
Royal Inland Hospital Kamloops
St Paul's Hospital Vancouver

St. Joseph's Hospital Victoria
St Paul's Hospital Vancouver
Vancouver General Hospital Vancouver

50 to 100 beds

Queen Victoria Hospital Revelstoke
St Mary's Hospital New Westminster
Vernon Jubilee Hospital Vernon

MANITOBA

100 or more beds

Brandon General Hospital Brandon
Children's Hospital Winnipeg
Grace Hospital Winnipeg
Kin Edward Hospital Winnipeg
King George Hospital Winnipeg
Misericordia Hospital Winnipeg
St. Boniface Hospital St Boniface
Victoria Hospital Winnipeg
Winnipeg General Hospital Winnipeg

NEW BRUNSWICK

100 or more beds

General Public Hospital St John
St John County Hospital East St John

50 to 100 beds

Chipman Memorial Hospital St Stephen
Hotel Dieu Campbellton
Hotel Dieu Chatham
Miramichi Hospital Newcastle
Moncton Hospital Moncton
St John's Infirmary St John
Soldiers Memorial Hospital Campbellton
Victoria Public Hospital Fredericton

NOVA SCOTIA

100 or more beds

St Joseph's Hospital Glace Bay
Salvation Army Hospital Halifax
Victoria Hospital Halifax

50 to 100 beds

Memorial Hospital New Glasgow
Children Hospital Halifax
General Hospital Cape Breton
Grace Maternity Hospital Halifax
Hants County Infirmary Hantsport
Highland View Hospital Amherst
St Martha Hospital Antigonish
St Anne Court Hospital Sydney
Yarmouth Hospital Yarmouth

ONTARIO

100 or more beds

Brantford General Hospital Brantford
General Hospital Toronto
Grace Hospital Toronto
Hamilton General Hospital Hamilton
Hotel Dieu Kingston
Hotel Dieu Windsor
General Hospital Kingston
Mount General Hospital Fort William
Ottawa Civic Hospital Ottawa
Protestant General Hospital Ottawa
St Joseph's Hospital Hamilton
St Joseph's Hospital London
St. Joseph's Hospital Port Arthur
St Joseph's Hospital Sudbury
St Lukes General Hospital Ottawa
St Michael's Hospital Toronto
Sick Children's Hospital Toronto
Western Hospital Toronto
Victoria Hospital London
Wellesley Hospital Toronto

50 to 100 beds

General Hospital Belleville
General Hospital Saint Ste Marie
Niagara Falls Memorial Hospital Niagara Falls
Nicholls Hospital Peterboro
Oshawa General Hospital Oshawa
Owen Sound General and Marine Hospital Owen Sound
Public Hospital Smith Falls
St Francis Hospital Smith Falls
St Joseph's Hospital Hotel Dieu
Welland County Hospital Welland
Wm Colles Hospital Toronto

PRINCE EDWARD ISLAND

50 to 100 bed

Charlottetown Hospital Charlottetown
Prince Edward Island Hospital Charlottetown
Prince County Hospital Summerside

QUEBEC

100 or more beds

Children Memorial Hospital Montreal
Dix Misericordia Hospital Montreal
General St Vincent Hospital Sherbrooke
Hotel Dieu Montreal
Jeffery Hale Hospital Quebec
Montreal General Hospital Montreal
Notre Dame Hospital Montreal
Royal Victoria Hospital Montreal
Saint Jean de Dieu Lasnier Montreal
Western Hospital Montreal

50 to 100 beds

Homeopathic Hospital Montreal
Montreal Foundling and Baby Hospital Montreal
Montreal Maternity Hospital Montreal
St Francois d'Assise Quebec
Sherbrooke Hospital Sherbrooke

SASKATCHEWAN

100 or more beds

Grey Nuns Hospital Regina
Moose Jaw General Hospital Moose Jaw
St Paul Hospital Saskatoon
Saskatoon City Hospital Saskatoon

50 to 100 bed

Holy Family Hospital Prince Albert
Notre Dame Hospital North Battleford
Palliser Hospital Moose Jaw
Victoria Hospital Prince Albert

HAWAII

Queen Hospital Honolulu

NEW ZEALAND

D edin H sp tal Dunedin

NATIONAL HOMES FOR DISABLED VOLUNTEER SOLDIERS

N ti nal Military Home Sawt lle California
National San tarium Hot Sprin s So th Dakota
Nati l San tar um Johnson City Tennes ee
N tional Milit ry H me H mpt n V rginia
Nati al Military H m D n ill Illin
Natio al S nitarium Ma ion Indiana
N t onal Military Home D yton Ohio
Natio al Military Home Milw kee Wisconsin
N t onal Military H me T gus M ne
National Military Home Leav wo th Kansa

MARINE HOSPITALS OF THE UNITED STATES PUBLIC HEALTH SERVICE

M ri H spital No 1 Baltimore Maryland
Ma ne Hosp tal No 10 Key West Fl rida
Marin H pital No 1 L isville Kent cky
Ma ne Hosp tal N 15 Pittsburgh Pennsylvania
Marin Hospital No 2 Savannah G orgia
Marine Hosp tal No 1 Stapl ton New Yo k
Marine Hosp tal N 43 Ellis Isl d New Yo k
Marine Hosp tal No 66 Carvill Louisvill
Marin H pital N 7 New York N w Yo k
Marine Hosp tal No 12 M mph s Tennessee
Marin H p tal N 13 Mobil Alabama
Marine Hospital N 14 New O leans Louisiana
Marin Hosp tal No 18 St Louis Missouri
M rin H pital N 82 Norf lk V rginia
Marine Hosp tal No 5 Chic go Illinois
M rin H p tal N 17 Pt T wnsend Washingto

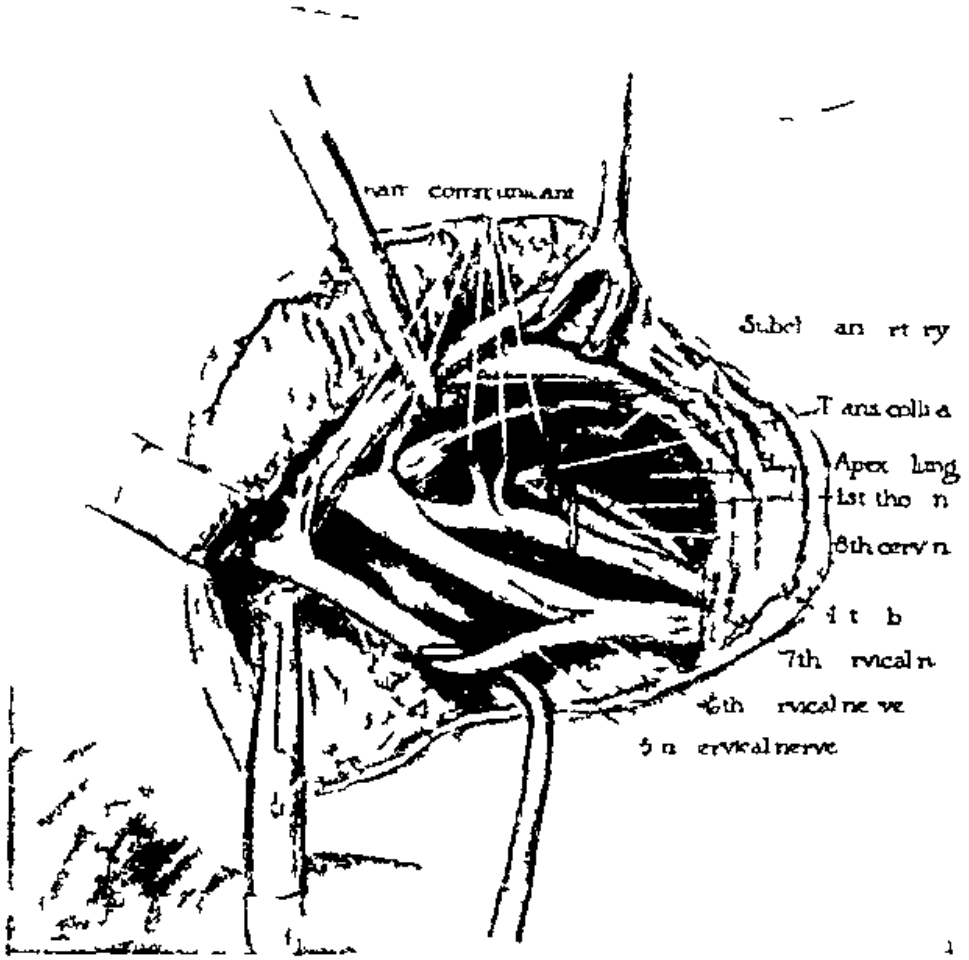


Fig 8 D t n c mpleted h wing ram j g erv tru ks as they m ge from terv t b al f m ua

The Treatment of Spastic Paralysis by Sympathetic Ramisection — Norman D Royle

SURGERY, GYNECOLOGY AND OBSTETRICS

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THE TREATMENT OF SPASTIC PARALYSIS BY SYMPATHETIC RAMISECTION

EXPERIMENTAL BASIS AND CLINICAL RESULTS[1]

BY NORMAN D ROYLE M B CH M SYDNEY AUSTRALIA
H o y O th pedic S geo t th Lew h m Hosp t l nd t h Ch ld W Mar D pa tm N w S th W l

PART I

THE surgical treatment of spastic paral ysis has been approached from various points of view Etiological considera tions have determined the procedures which deal with the cerebral cortex itself abnormal tonic conditions of the musculature have focused attention upon the peripheral nervous system and the disabilities arising from de formity and contracture have indicated tenot omies and other orthopedic measures

THE PROBLEM OF TREATMENT IN SPASTIC PARALYSIS

At the outset it may be said that no method of treatment can have much effect in restoring the action of spastic muscles in the absence of definite cerebral control The problem as it appeared to me was to make effective the existing cerebral control as a preliminary to the educative or re-educative proces es The mere presence of hypertonicity should not prevent the smooth performance of a move- me t if the muscle groups can be definitely innervated The clinical picture in spastic paralysis indicates however that the effect of cerebral control is nullified by a failure of the normal process or inhibition in the muscle groups antagonistic to tho e performing a definite movement To this I have drawn attention in an article in the *Medical Journal of Australia* February 19 1919 which in cludes a record of a clinical experiment on the following plan An ankle clonus was induced and the dorsiflexing muscles of the ankle joint were then stimulated electrically The clonus in the plantarflexors was not inhibited during the contraction of the antagonistic muscles unless these muscles were completely con tracted This phenomenon suggested to me that the mechanism of reciprocal innervation was in some way not effective in spastic paralysis It was a feature that could not be explained by the accepted physiology of mu cle tonus and it occurred to me that it might be due to the influence of the sym pathetic nerves

THE DOUBLE INNERVATION OF STRIATED MUSCLE

The presence of non medullated nerves apparently of sympathetic origin supplying voluntary muscle was first demonstrated clearly by I erroncito in 1902 but it was not until 1921 that my attention was drawn to the fact Other ob ervers verified his findings and attempts were made to a certain the function of these non medullated fibers DeBoer found that the normal tonus of the hind limbs of the frog and of the cat disappeared after the

[1] The J A B Murphy Oration in S rgery presen ed before the Clinical Congress of American College of Surgeons, New York October 9 4

removal of the sympathetic nerve supply This result has never been accepted but the idea has been rejected principally because the removal of the sympathetic nerves in the hands of a number of investigators has failed to affect consistently the onset or maintenance of decerebrate rigidity

The principle of reciprocal innervation and many of our ideas on muscle tonus we owe to the work of C S Sherrington on decerebrate animals He found that when the mid brain was cut through in a certain position the excitability of the centers controlling the extensor or antigravitational muscles of the head trunk and limbs was so increased that ordinary stimuli arising from the periphery maintained these muscles in a state of reflex tonic contraction These muscles displayed some remarkable characteristics If an attempt be made to flex the extended limb of a decerebrate animal resistance to passive movement will relax after an interval and the limb will tend to remain in the position imposed by the passive movement The limb of a decerebrate animal do not always remain extended but may relax and take up a semi flexed position If the limb be now passively carried into extension it will remain in the extended position These phenomena have been described by Sherrington as lengthening and shortening reactions The term plastic tone was introduced by him to describe this posture maintaining mechanism J W Langelaan recently repeated de Boer s experiments and found that certain changes in tonus followed the removal of the sympathetic nerves in the hind limb of the frog These changes he ascribed to the loss of the plastic element in tonus He found however that the muscles deprived of their sympathetic nerve supply still retained features usually accepted as evidence of tonus and he attributed these features to the presence of contractile tone depending upon the medullated nerves Langelaan did not carry out investigations in decerebrate animals For this reason his results are still open to question though the test set up is an arbitrary one depending on the assumption that the mechanism of normal tone is responsible for the abnormal conditions seen in decerebrate rigidity

The undetermined function of the sympathetic nerves supplying voluntary muscles opened up a possibility in solving a clinical problem I decided to investigate—

1 The function of the sympathetic nerve supply to striated muscle

2 The possible relationship between the function of the sympathetic nerves and the phenomena of spastic paralysis

The investigation was actually undertaken with a view to finding some means of relieving the disabilities following gunshot wounds of the cerebral cortex

Part II Experiments to Determine the Function of the Sympathetic Nerves

My first plan was to cause spastic paralysis by traumatizing the cerebral cortex in the animal subject and to observe subsequently the effect of the removal of the sympathetic nerves upon the resulting paralysis I carried out a number of experiments but these were unsuccessful in that I could not reproduce the spastic condition seen in the human subject following lesions of the cerebral cortex This plan had to be abandoned and I was indebted to Dr J I Hunter for the suggestion that the spinal animal would possibly be a suitable medium for observing the effect of removing the sympathetic nerves upon hypertonic muscles

Experimental Observation upon Spinal Animals

Observations were made upon three spinal animals The goat was used for these and all subsequent observations because of its well defined abdominal sympathetic trunk In smaller animals such as the rabbit it is not always easy to be sure of the complete removal of the sympathetic trunk on one side and on one side only

In a spinal animal the removal of the left abdominal sympathetic trunk had a striking effect Following transection of the cord the lower limbs assumed the position of flexion and adduction This is more evident when the animal is placed on its back The removal of the sympathetic nerves on the left side was followed by an immediate change in posture in the left lower limb This limb assumed a

more extended and abducted position than the right

The knee and the ankle jerks on the right side were exaggerated and the limb returned to the flexed attitude after the completion of the knee jerk In the left limb both knee and ankle jerks were obtained but were of smaller amplitude and were less easily elicited When the left lower limb was placed in the flexed attitude the extension caused by the knee jerk was not followed by a return to the flexed attitude but the limb remained extended The resistance offered to passive movements in the right lower limb was definite but the left lower limb could be moved passively without any noticeable resistance The whole reflex activity of the left lower limb was depressed For instance passive extension of the right lower limb was followed by two or three movements of flexion while extension of the left lower limb resulted in only a slight degree of adduction of the thigh When both lower limbs were extended simultaneously the right was immediately drawn into the flexed attitude but the left remained extended After the sixteenth day a change appeared in the lower limbs of one animal and the reflex activity on the left side became greater than on the right

Two of the spinal animals showed these changes but neither survived 3 days In the third animal hemisection of the cord on the left side was followed by the removal of the left abdominal sympathetic trunk Paralysis of both lower limbs followed this procedure but the animal could walk with difficulty at the end of 14 days The left lower limb could be only defectively controlled at this stage and would collapse when weight was placed upon it After an interval of 3 months the animal could walk well and run This animal was kept for over 11 months and when placed on its back retained the characteristic change in posture in the left lower limb In this animal the right limb behaved as in a normal animal and remained extended The left fell into a position determined by gravity

EXPERIMENTS IN THE NORMAL ANIMAL

The experimental results in the spinal animal were encouraging but as I was seeking a therapeutic measure I had next to determine the effect of removing sympathetic influence from muscles under normal voluntary control There was also the possibility of wasting to be considered

The removal of sympathetic nerve supply to the left lower limb of otherwise normal animals did not lead to wasting or apparent loss of power The animals retained the ability to stand walk and run in a normal manner Certain characteristic differences were observed

A normal animal when placed on its back evidently endeavors to correct a feeling of instability by strongly extending all four limbs When the sympathetic nerves were removed from the left side the animal could still extend the left lower limb but the limb would gradually drop into a more flexed attitude If the animal were frightened the limb could again be extended In these normal animals for some days after the removal of the sympathetic nerve supply a coarse tremor appeared in the left lower limb when the animal was resisting a passive movement In one animal which was closely observed this tremor disappeared at the end of 11 days In a typical animal when both lower limbs were flexed and relaxed the left one fell away from the flexed position This occurred gradually in definite jerky movements from position to position until complete extension was reached There was little appreciable difference in the amplitude of the tendon reflexes on either side These animals were observed for a period of many months

EFFECT OF DIVISION OF THE SYMPATHETIC NERVES UPON DECEREBRATE RIGIDITY

The inconsistent results recorded by previous investigators after the removal of the sympathetic nerve in decerebrate animals called for some explanation and it appeared to me that in some instances the plan of experiment may have been at fault In addition to those previously reported[1] I have observed the effect of the removal of the sympathetic nerves in a large number of decerebrate animals in which the results have always been consistent The plan adopted in

these experiments was to remove the abdominal sympathetic trunk in one operation and to allow the animal to recover from the effects of surgical interference before decerebration was carried out By these two-stage operations any sensory disturbance that might be set up by the wound in the lumbar region is avoided The decerebration was carried out by gradually removing the brain until the appropriate level was reached Intratracheal anesthesia was employed before decerebration and fresh air was pumped into the trachea after decerebration *In several instances I was struck* with the difficulty of making accurate observations in the presence of partial asphyxia The left lower limb was always used in observing the effects of removing the sympathetic nerve supply

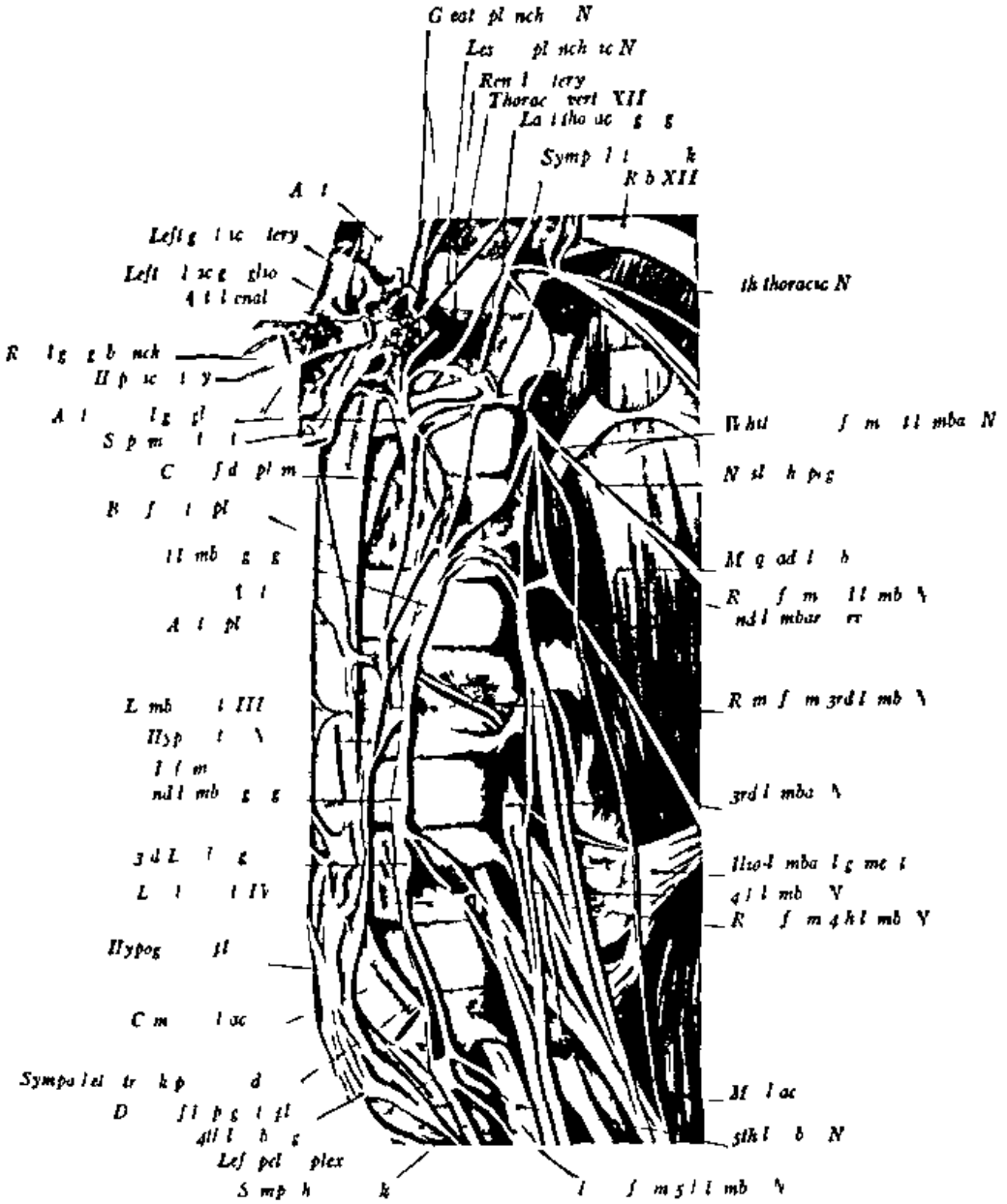
In all these experiments the onset of decerebrate rigidity was characterized by extension of all four limbs but the left lower limb could be much more easily relaxed than the right *In the intervals when rigidity of the lower* limbs was less it was seen that the characteristics of decerebrate rigidity as described by Sherrington were not present If the right lower limbs for example were passively extended *the limb tended to remain in extension* if the left one were extended the limb would fall into a flexed position as soon as it was released In other words lengthening and shortening reactions were very much less evident and *in some instances were absent from* the left lower limb Resistance to passive movement was very much greater in the right lower limb than in the left and reflex phenomena were more active on the right side The *knee jerk for example was much more easily* elicited on the right side If however the left lower limb were put into a similar position to that assumed by the right lower limb the knee jerk exhibited about the same amplitude of movement *but exhibited a difference in quality* On the left side extension of the leg imposed by the contraction of the quadriceps muscle was immediately followed by relaxation of the muscle and flexion of the leg On *the right side extension of the leg was main*tained in the position imposed by the knee jerk In some instances if extension were not completely maintained the movement of flexion due to the influence of gravity took three or four times as long as the extending movement These changes *in the left lower limb* varied with the time interval between the removal of the sympathetic trunk and the operation of decerebration The longest interval was 73 days and this gave the greatest *contrast in the behavior of the lower limbs*

SUMMARY OF EXPERIMENTAL RESULTS

The complete removal of the sympathetic nerves from the left lower limb of the normal *animal the spinal animal and the decerebrate* animal produced a similar result in each instance The normal animal retained the ability to control the movements of the limb but a characteristic change was observed when the *animal was placed on its back The left lower* limb could not then be maintained in steady extension similar to that displayed in the right lower limb In the spinal animal the posture of flexion imposed upon the right lower limb *by the reflex action of the spinal cord* was lost The left lower limb assumed a posture of extension and abduction under the influence of gravity In the decerebrate animal the posture of extension was imposed upon the *left lower limb as well as upon the right* but was not maintained against gravity In addition lengthening and shortening reactions were absent on the left side The plastic tone of Sherrington was therefore absent in a *limb deprived of its sympathetic nerve supply* All evidence of tone was not abolished by this means Tendon jerks for example could still be obtained and must be ascribed to the presence of contractile tone derived through *the medullated nerves* The maintenance of posture is thus a function of the sympathetic nerves supplying voluntary muscles The resistance to passive change in posture in all experimental animals was less after dividing *the sympathetic nerve supply* of a limb This was due to the abolition of plastic or posture maintaining tone

PART III EXPERIMENTAL OPERATION ON THE HUMAN SUBJECT

Spastic paralysis in the human subject has some features in common with the conditions seen in these experimental animals but in spite



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of the results that I had obtained experi mentally I could not be certain that the re moval of the sympathetic nerves would have a beneficial effect in the human subject The only possibility of arriving at finality was to perform an experimental operation and I would like to say in this connection how much I am indebted to my first patient for the manner in which he offered himself as I was not in a position to assure my patient that a satisfactory result would follow I could only assure him that all reasonable care would be exercised The patient considered his dis ability so great that it could not be made worse and I think this represented a reason able medical opinion also

First patient A C had a gunshot wound of the cerebral cortex The bullet entered his skull just above the left ear and had caused an extensive lacer ation of the cerebral hemisphere in the region of the cent al sulcus of the left side The wound had ex tended across the middle line on to the opposite cerebral hemisphere The patient at the time of the operation was 30 years of age and the injury had been received 7 years previously He had been unable to speak for 3 months and to walk at all for o er 2 years after the receipt of the injury Spastic

hemiplegia affected both limbs on the right side the left lower limb was spastic although only in the leg and foot The knee jerk of the left lower limb was normal the ankle jerk was exaggerated and there was an ankle clonus The whole foot was rigid and the patient's control was very defective The only deformity present on the left side was a slight degree of talipes equinus On the right side there was an exaggerated knee jerk a patellar clonus an ankle clonus and an increase in the ankle jerk The patient could walk but had the greatest difficulty in controlling the right lower limb When placed upright on the limb there appeared a coarse uncontrollable tremor He could not stand on the right lower limb though he could stand comfortably on the left It was only possible for him to come forward which could not walk laterally or backward Talipes equinus was present on the right side This patient was subject to occasional tonic fits which were of only short duration and which could readily be controlled by the administration of sedatives The control of his genito urinary system was normal but the patient suffered from chronic constipation This patient was subjected to operation on September 1 1923

OPERATION OF THE LUMBAR SYMPATHETIC RAMISECTION

In the animal subject the sympathetic influence was removed from the left lower limb simply by avulsing the left abdominal sympathetic trunk This operation could not be considered in the human subject on account of the changes that would follow removal of the sympathetic nerves to the abdominal viscera The sympathetic nerves supplying the muscles of the lower limb arise from the lumbar ganglia and pass through the rami communicantes to the medullated nerves of the lumbosacral plexus The sympathetic ganglia receive preganglionic fibers from the medullated nerves and then may be given off as caudally as the third lumbar nerve Usually the contribution of medullated nerves to the sympathetic system ceases at the level of the second lumbar nerve The distinction of white and gray rami in this situation is impossible as it has been shown by Harman that the rami of the second and third nerves may contain both white and gray fibers The sympathetic supply to the abdominal viscera is given off from the ganglionated trunk in a medial direction and provided the operation of ramisection were confined to lateral branches directed from the sympathetic trunk to the ordinary medullated nerves of the second third and fourth lumbar segments the effect upon the abdominal organs would be negligible The division of the sympathetic supply to the fifth lumbar and to the sacral nerves presented a more difficult surgical problem but this solved itself readily because the sympathetic supply of the viscera is usually given off above the level of the fifth lumbar nerve and complete division of the sympathetic trunk at any point below the level of the fourth lumbar nerve would not affect the viscera The sympathetic ganglia are not regular structures and do not always correspond in position to the lumbar nerves The first ganglion usually lies in relationship to the second lumbar vertebra or the intervertebral disc below this vertebra Below this the trunk may have three or more ganglia There may however be only two definite ganglia

The plan I adopted in the first operation was to divide the rami communicantes of the second third and fourth lumbar nerves and to divide the sympathetic trunk at a level corresponding to the fourth lumbar vertebra The exact level of section must depend however upon the presence of a ganglion in this situation and also whether that ganglion is supplying any medially directed fibers

The ganglionated trunk itself is a very variable structure and this particularly applies to the region of the fourth lumbar vertebra On many occasions the trunk in this situation has been found to divide and it was difficult to decide which division continued downward as the main trunk The plan subsequently adopted was to define the ganglion which gives gray rami to the fourth lumbar nerve lift it from its bed and remove its lateral posterior and inferior connections Any medial fibers should be carefully preserved When this ganglion is not present the ganglion supplying the third lumbar nerve may be unusually large and supply rami to the third and fourth nerves The size of the ganglionated trunk may vary on each side of the body and the rami may or may not come from the region of the ganglia

The size of the rami varies with the number A single ramus supplying a single nerve may be millimeters in diameter though the usual

size of a ramus varies between 0 5 millimeter and 1 5 millimeters The accompanying diagram (Fig 1) shows that the lumbar ganglion corresponding in position to the second lumbar nerve receives a large white ramus from the first lumbar nerve In my series of 42 lumbar operations this arrangement was almost invariable in only one instance was this large branch absent In the first operation this ramus was mistaken for the white ramus of the second lumbar nerve and was divided but subsequently the ramus has been avoided unless a special therapeutic effect was sought In every operation both the white and gray rami of the second lumbar nerve have been divided The position of the ganglia may cause considerable variation in the position and direction of the rami but with the exception mentioned above the rami tend to travel laterally or laterally and downward

SURGICAL APPROACH TO THE ABDOMINAL SYMPATHETIC TRUNK

The patient should be made to lie on the side opposite to that of operation and should be inclined slightly toward the surgeon who faces the patient s back The space between the ribs and the crest of ilium should be made as wide as possible by placing a sandbag beneath the patient or better still by using the adjustable support devised for operations on the kidney

Step 1 The incision is made from the last rib to the crest of the ilium and thence forward to the anterior superior spine of the ilium If the quadratus lumborum muscle can be palpated the downwardly directed part of the incision should follow its lateral margin but if not the lateral margin of the sacrospinalis should serve as a guide The forwardly directed part of the incision should lie about 1 centimeter below the actual crest of the ilium This enables the attachment of the external oblique muscle to be exposed The flap of skin and fascia outlined by this incision is reflected forward to expose the attachments of the latissimus dorsi to the lumbodorsal fascia and of the external oblique muscle to the crest of the ilium

Step The trigonum lumbale petiti is next defined and from this point forward the oblique muscles are freed from the crest of the ilium to within 6 or 8 centimeters of the anterosuperior spine of the ilium In doing this it is possible in most subjects to divide the external oblique through definite tendinous tissue close to its insertion and to avoid cutting the actual muscle fibers This gives a decided advantage in closing the wound The internal oblique and the transversus abdominis muscles are divided through the muscle fibers close to their attachment The dissection is then carried upward and the lumbodorsal fascia is divided at the lateral border of the quadratus lumborum In doing this it may be necessary to cut through the fibers of the latissimus dorsi

Step 3 The abdominal wall is now free to be thrown forward and after dividing the fascia transversalis the hand can be passed in front of the quadratus lumborum and the psoas muscles until the medial border of the psoas is palpated Suitable retractors are then placed in position Care should be taken not to disturb the fascia covering the quadratus lumborum and the fascia covering the psoas muscle

In a very fat subject however the approach to the sympathetic trunk may be rendered more easy by leaving the fascia transversalis intact except at the medial border of the psoas muscle where it must be pierced to reach the sympathetic trunk The ganglionated sympathetic trunk can often definitely be palpated where it lies at the medial border of the psoas muscle before it can be seen The psoas itself sometimes constitutes a difficulty in the adult subject by obscuring the trunk from view and a suitable retractor is necessary to flatten the muscle In children and poorly developed subjects this difficulty is not great

The ganglionated sympathetic trunk will be found lying on the bodies of the lumbar vertebræ near the medial border of the psoas muscle The abdominal sympathetic trunk on the left side is easy to define if the medial border of the psoas is sought In this situation a thin layer of connective tissue passes from the psoas muscles across the sympathetic trunk and great vessels to the region of the psoas on the opposite side This is easily slit with a

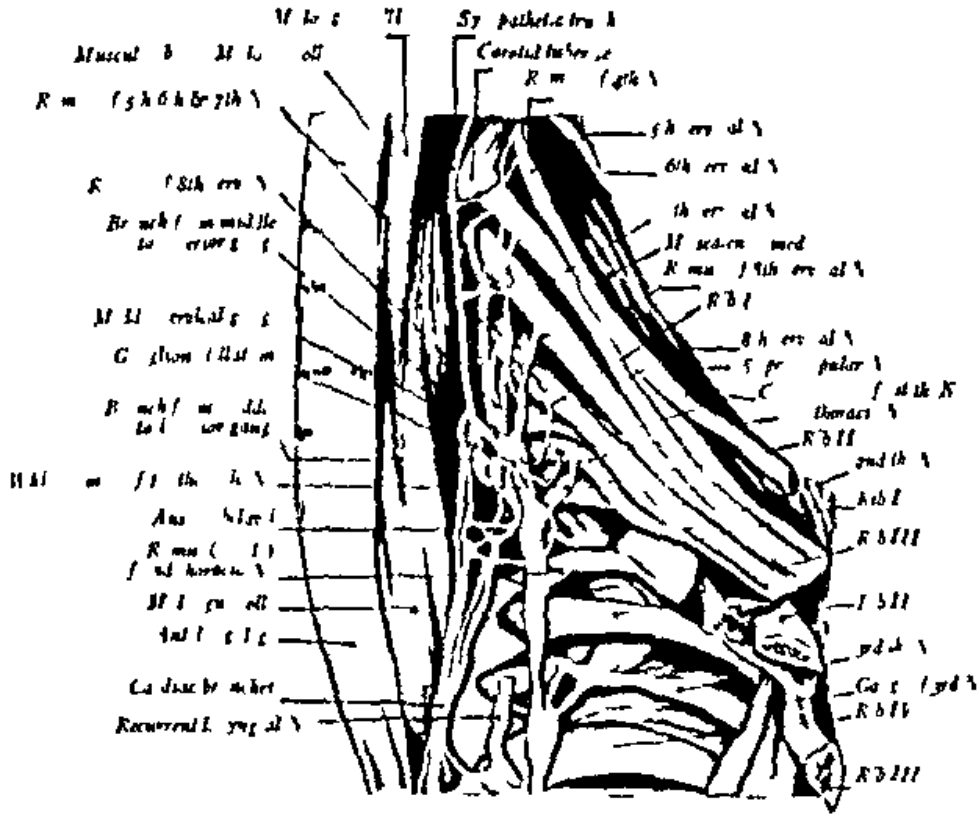


Fig 2 Dissection showing lower thoracic and upper lumbar portions of sympathetic nervous system on left side Muscular sheath of rectus abdominis muscle removed Viewed from in front and to left (Reproduced by courtesy of Dr T K Potts)

blunt dissector and the sympathetic trunk comes into view On the right side the trunk lies under the lateral margin of the inferior vena cava and is usually placed anteriorly to the lumbar vessels Thus however is by no means constant for on several occasions I have experienced difficulty from the lumbar veins crossing anteriorly to the sympathetic trunk When this occurs the operation may be simplified by removing one or more of these veins On the left side this complication has not been met but in young subjects the lumbar arteries can be mistaken for rami communicantes which they sometimes resemble in size and direction In a few instances the lumbar lymphatic vessels and an unusually low formation of the receptaculum chyli has made the definition of the sympathetic trunk more difficult In one instance the lymphatic vessels lay between the sympathetic trunk and the attachments of the psoas muscle On lifting the lymphatic vessels the rami appeared from under their posterior surfaces and patient dissection was required to define each structure

In defining the sympathetic trunk long blunt dissectors are necessary My dissectors are 25 centimeters long and have rounded ends A long probe with a flat handle and curved on its end like a strabismus hook is useful for lifting the sympathetic trunk when defining its branches Long straight or slightly curved artery forceps 20 centimeters long are also essential and four should be provided The structures of the abdominal wall and abdominal viscera demand a large broad and deep retractor My own as illustrated for the average adult subject is 8 75 centimeters wide and 12 5 centimeters deep It is constructed to act as a light reflecting surface and has a shelf extending forward from its lower edge so as to depress structures medial to the ganglionated cord The sympathetic trunk and the rami communicantes should be clearly defined before section The method of dividing the rami communicantes is usually by avulsion Each ramus may be seized by a pair of artery forceps and drawn away from its lateral connections though in many instances it is nec

essary to divide a big ramus with a long pair of blunt pointed scissors In young subjects the rami may be easily and effectively broken with the blunt dissector When ramisection of the second third and fourth lumbar nerves has been effected the ganglionated cord is then divided at a level corresponding in position to the fourth lumbar nerve The operation is then completed The edges of the lumbodorsal fascia are first sutured in the region of the trigonum lumbale The oblique muscles are then sutured to the crest of the ilium and a special point is made of suturing the tendinous portion of the external oblique to its original attachment and to the adjacent fascia lata When this is done carefully the raw area on the crest of the ilium comes in contact with a raw area of considerable width on the under surface of the external oblique tendon and this facilitates adhesion The lumbodorsal fascia and the latissimus dorsi muscles are then sutured The skin is closed without drainage

The whole operation should be performed with very little loss of blood except from small vessels occasionally encountered in freeing the oblique muscles There is no bleeding in the depth of the wound if the approach is confined to the plane between the peritoneum and the fascia covering the quadratus lumborum and the psoas muscles Sharp instruments should not be introduced into this wound The essential dissection can be done with blunt dissectors and long artery forceps

The iliohypogastric and ilio inguinal nerves are both retracted forward with the abdominal wall and the ureter with the parietal peritoneum The incision has been designed as far as possible to divde only fibrous structures in approaching the sympathetic trunk The internal oblique and the transversus abdominis muscles have usually to be divided through their muscle fibers at their insertion to the crest of the ilium The incision also avoids all important nerves and blood vessels and if carefully sutured should leave the abdominal wall as strong as before the operation

THE OPERATION OF CERVICAL RAMISECTION

The rami communicantes only are divided in the cervical operation The sympathetic



Fig 3 Royle operation Sympathetic ramisection Cervical incision The stages of the operation are shown from the viewpoint

trunk does not come into the field of operation excepting in the approach to the first thoracic nerve The rami above the first thoracic nerve are postganglionic fibers but the first thoracic nerve itself usually has both a white and a gray ramus The sympathetic rami usually enter the nerve roots of the brachial plexus after they emerge from the intervertebral foramina though occasionally rami will be found joining the nerve roots within the foramina

According to the description of normal anatomy the nerve roots of the brachial plexus should emerge between the scalenus anterior and the scalenus medius muscles At operation it is exceptional to find this arrangement It is much more common to find the fifth and sixth roots piercing the scalenus anterior and in several instances these roots have appeared anteriorly to the muscle The seventh nerve also is commonly separated from the eighth by a bundle of muscle fibers

The eighth and the first thoracic nerves usually emerge together in a plane posterior to the scalenus anterior A regular plexus considerably simplifies the operation while the difficulty is increased if each nerve root emerges separately through the scalenus anterior

Step 1 The patient lies with the chin turned away from the site of operation and with a small pillow placed beneath the shoulders The field of operation is reached through an incision extending from the clavicular insertion of the sternomastoid backward and upward across the posterior triangle In young

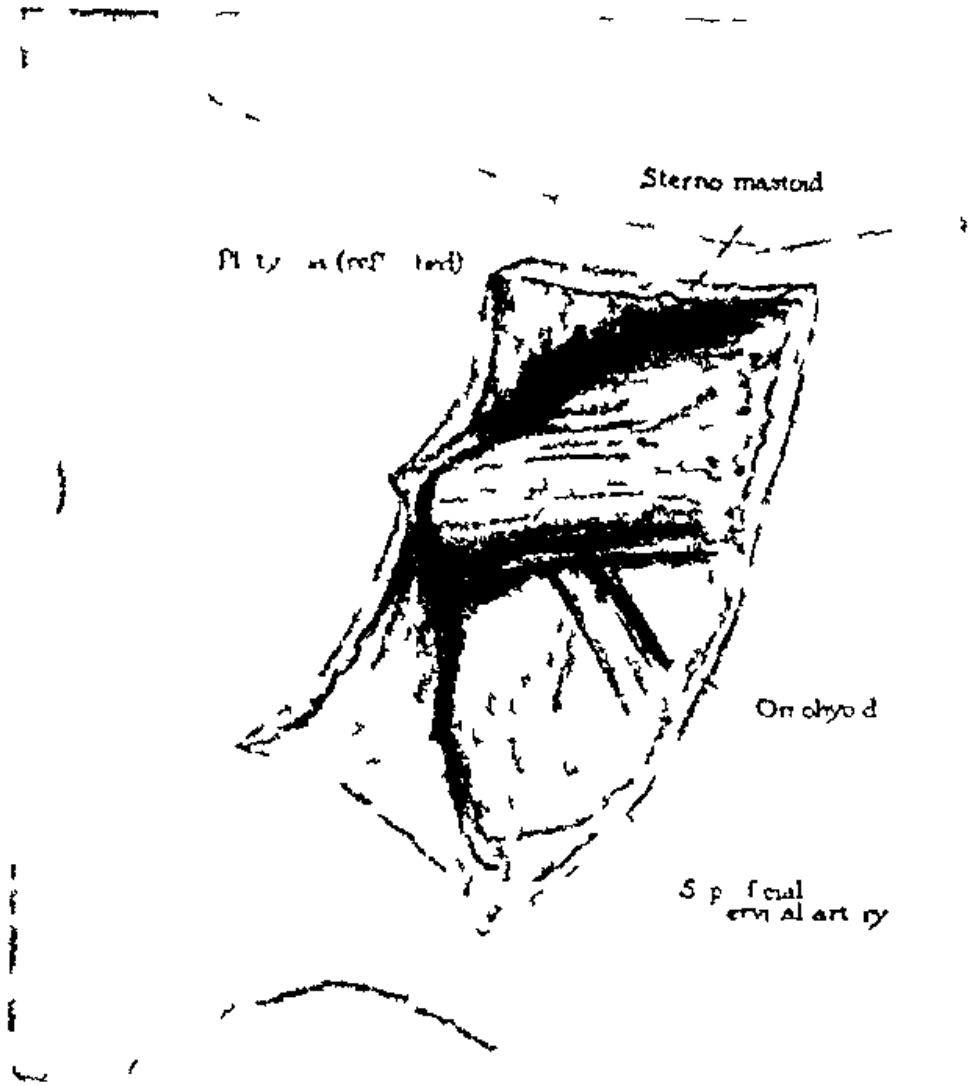


Fig. 4. The platysma reflected.

subjects and in those patients in whom the nerve roots all emerge from behind the scalenus anterior this incision suffices but occasionally it is necessary to make a second small incision upward along the posterior border of the sternomastoid to be sure of reaching the connections to the fifth and the sixth nerves (Fig. 3).

Step 2. The platysma is divided and the external jugular vein is secured in the line of the original incision. The anterior layer of the *cervical fascia is divided and blunt dissection* is then carried out to expose the deeper layer of fascia covering the brachial plexus and the scalenus muscles. Between these two layers of fascia the superficial cervical artery will be found occasionally. The transversus colli artery appears in a deeper plane crossing the nerve roots and in my series most frequently between the seventh and eighth nerve roots. To obtain a clearer view of the plexus this artery should be ligated and divided. The omohyoid muscle which also appears in this space can be easily retracted downward out of the field. (Figs. 4 and 5.)

Step 3. In the upper part of the plexus it is necessary to look for and define the phrenic nerve as it lies on anterior aspect of the scalenus muscle. (Fig. 6.) The nerve roots are *then exposed and traced to the intervertebral foramina.* The subclavian artery is identified and retracted forward to expose the eighth cervical and the first thoracic nerve. The rami communicantes are not easy to define. Those to the fifth and sixth nerves may come across the anterior surface of the scalenus anterior to

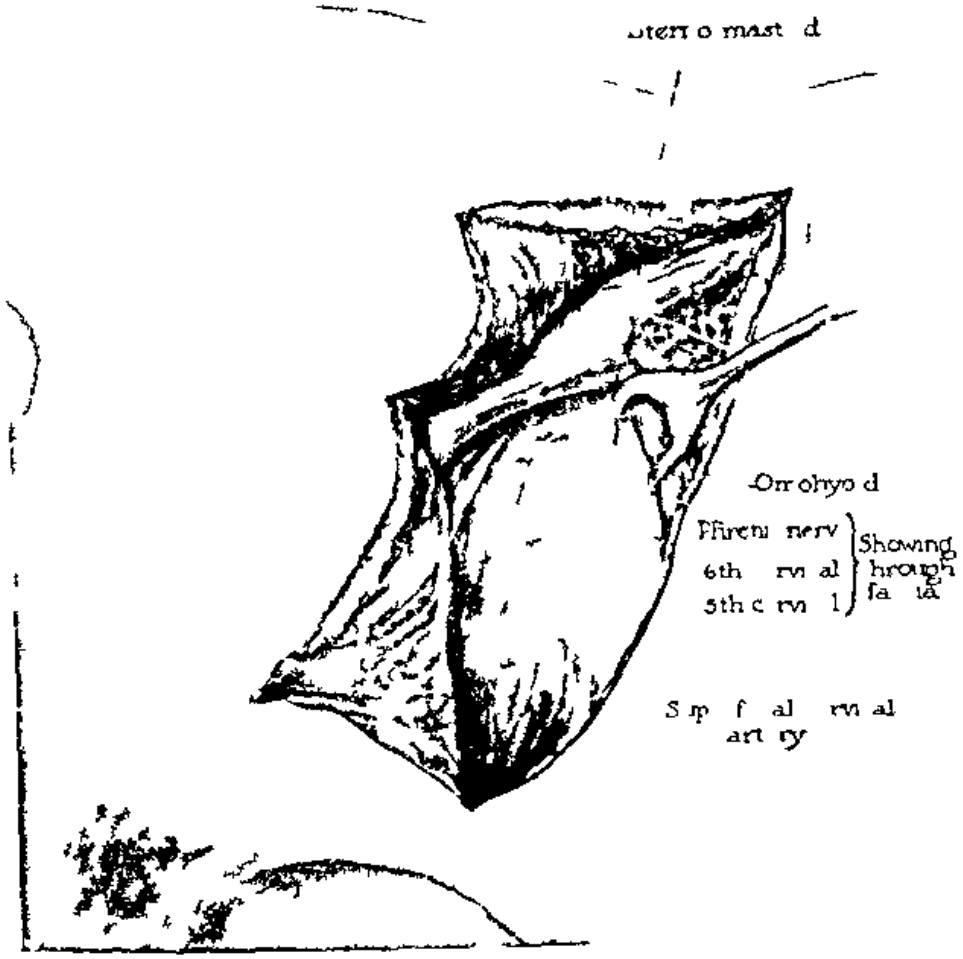


Fig 5 Omohyoid retracted

join the nerve trunks or they may come through the muscle itself (Fig 8) In addition there may be two or more branches and it is necessary in dealing with each of the nerve roots to be sure that all anterior connections are divided right up to the intervertebral foramina Gray rami may join the nerve roots on their antero inferior aspects and in many instances must be sought there This particularly applies to the eighth nerve Medullated muscular branches will also be found on the anterior aspect of the nerve roots These may be confused with sympathetic rami and if there is any doubt should be removed When the phrenic nerve receives communications from the fifth cervical nerve it will be found necessary to retract it laterally to get a clearer view of the trunk of the fifth nerve The greatest difficulty will be found in connection with the eighth cervical and the first thoracic nerves In approaching this part of the dissection the first rib should be palpated and the first thoracic nerve sought as it crosses the neck of the rib This nerve trunk can then be traced into the thorax The cervical sympathetic trunk will be found on a plane posterior to the subclavian artery and if it can be well defined no difficulty will be experienced in picking up the communicating rami to the eighth nerve At this point the trunk usually moves to a more medial position as it travels into the neck but sometimes it will be found lying upon the root of the eighth nerve The gray ramus of the first thoracic nerve is found on its superior surface medial to the white ramus which should be avoided if possible

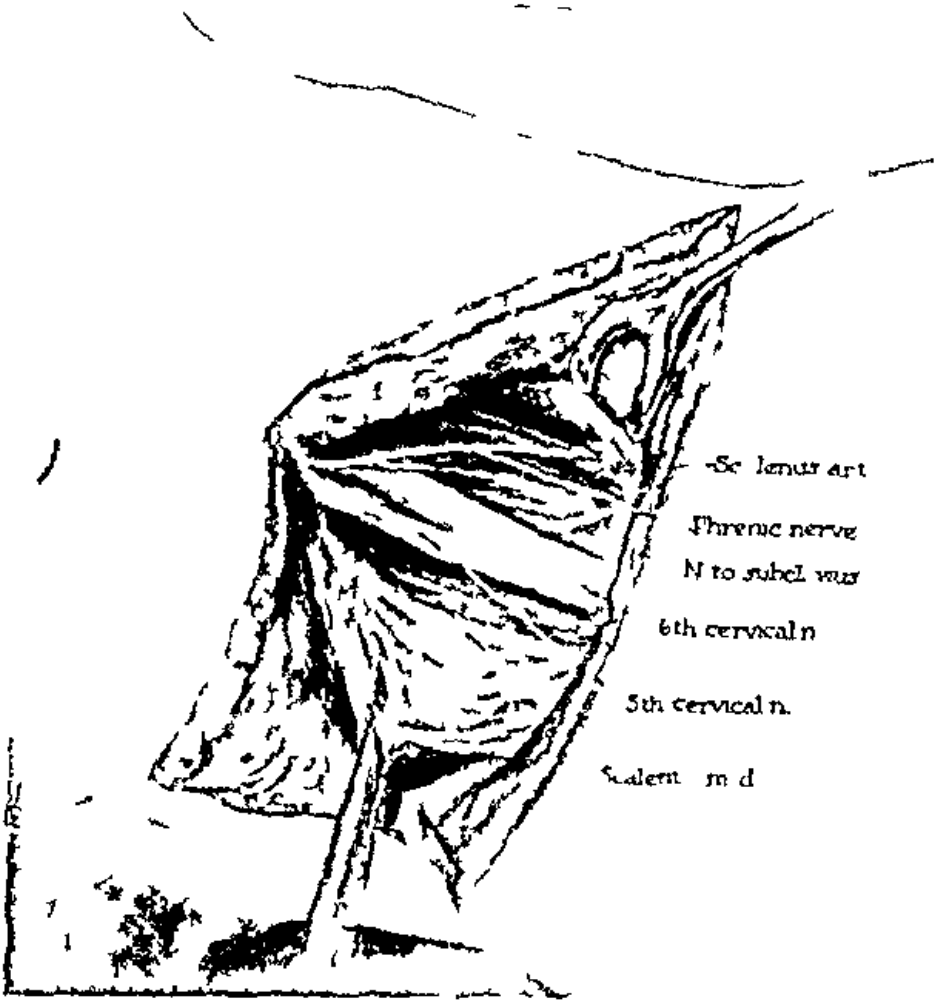


Fig 6 Fascia pened shown g scale a d fifth a d uth n rves jo ni g to f rm upper trunk

The rami in this operation may usually be easily broken with a small strabismus hook After ramisection has been completed the wound is closed by drawing together the edges of the platysma and by suturing the skin without drainage

Part IV Changes Which Occur in the Human Subject After Sympathetic Ramisection

The experimental operation revealed that striking changes in the hypertonic condition of the right spastic lower limb of the first patient followed division of the sympathetic nerves The changes were typical of tho e oc curring in all cases in which the paralysis was caused by a similar lesion The first case will be used as an example and comments will be added from subsequent results

1 *Vasomotor changes* The patient (A C) had very little discomfort following the opera tion and was examined within 6 hours The operation had been performed for the relief of paralysis on the right lower limb and this felt warmer than the left lower limb There was no actual difference of temperature to be de tected with an ordinary clinical thermometer The right lower limb was a deeper pink color than the left and there was capillary dilata tion There was no œdema but the circum ference of the calf was about 1 centimeter larger than that of the left This flushed appearance was present for some time after this operation but was much more striking in many subsequent patients On the twelfth day the color was still more pronounced than on the left and returned twice as quickly after pressure At the end of the seventeenth day

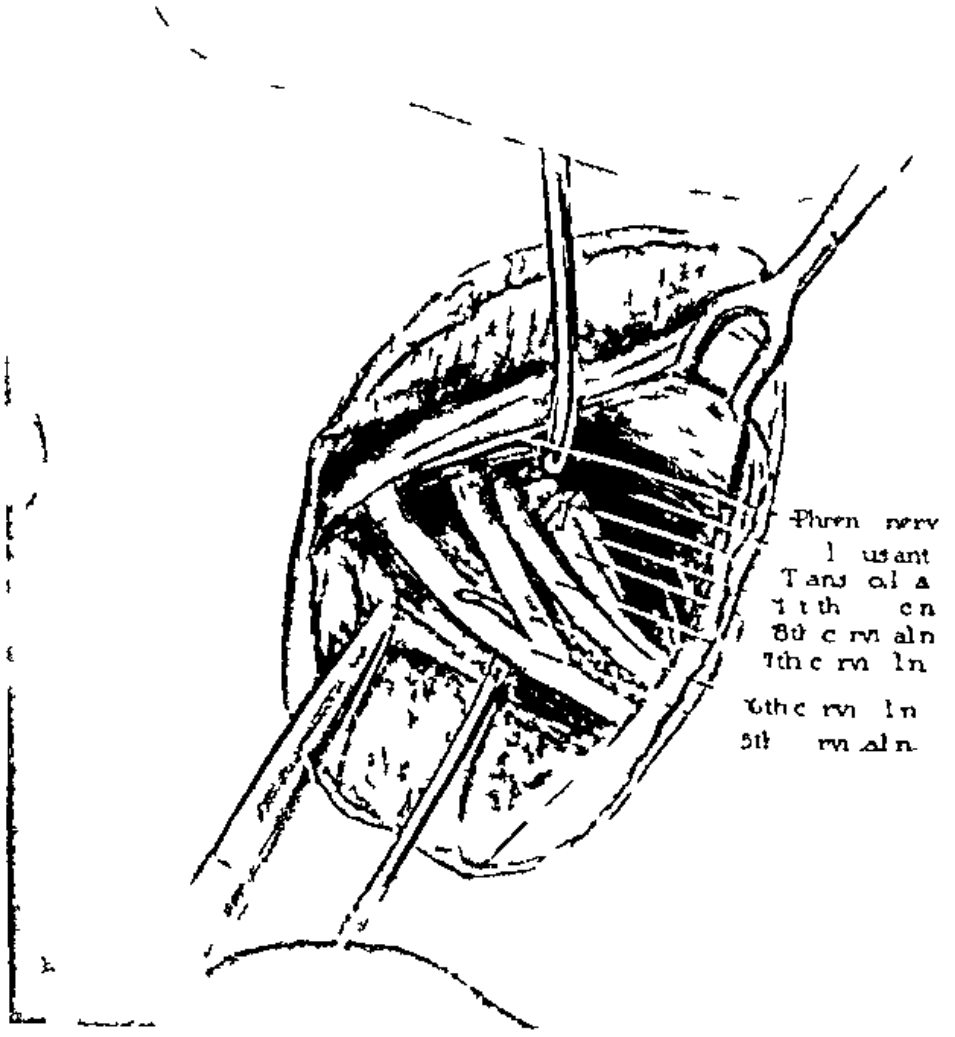


Fig 7 Sc l e m les ep rat d now sh w g se e th d e ghth cer l and first th r cic rve

the vasomotor disturbance had practically disappeared in this patient and there was very little difference in the rate of return of color after the removal of pressure The first patient was unconscious of any change in temperature though many subsequent patients described a feeling of warmth This makes an impression upon them because a spastic limb is usually cold and clammy One striking change that many patients have reported is freedom from chilblains during cold weather One small girl wished to have the operation performed on the right upper limb on account of the comfort which followed sympathetic ramisection in both lower limbs previously affected with chilblains

2 *Changes in tone* One of the most remarkable early changes was the alteration in tone in the right lower limb in the first patient This patient was a good subject for an experimental operation since both feet were spastic and the left one was an excellent control when examining the changes that had occurred in the right Before operation passive dorsiflexion of the foot was accompanied by ankle clonus and when the foot was released it tended to stay in dorsiflexed position with the tendons of the dorsiflexing muscles standing out prominently After operation the tendency for clonus to appear on the right side became progressively less and when the dorsiflexed foot was released it fell immediately into plantar flexion This was a striking contrast to the left foot which still retained a vigorous clonus and remained in the dorsiflexed position for an appreciable time after

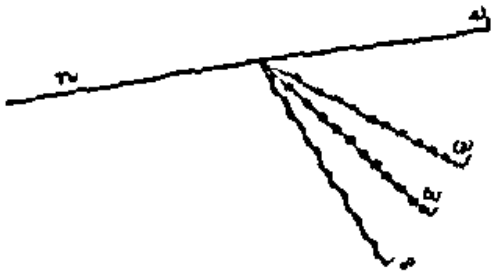


Fig. 9. Diagram of successive knee jerk showing successive effect.

passive dorsiflexion. This was one of the first changes to occur and is still exhibited in this patient over 1 year since the operation was performed. In these patients reflex activity does not disappear after operation and it is quite easy, for example, to elicit a knee or ankle jerk. Abnormal reflex excitability is, however, usually depressed after operation. It will be remembered that in the experiments reflex activity was exhibited after removal of sympathetic influence, but that the characteristic change in the experimental animals was inability to maintain posture imposed by active or by passive movement.

The normal knee jerk in the human subject can be shown to have a definite phase in which the position of extension imposed by the jerk is momentarily maintained. This is usually credited to a shortening reaction in the quadriceps. In the spastic paralytic the reflex activity may cause much greater amplitude in the knee jerk, and in addition much greater tendency for the position imposed by the knee jerk to be maintained. In one instance I saw this position maintained for 11 second, and in another for some minutes. One particular case illustrated the changes that occurred after ramisection in the shortening reaction of the quadriceps. The patient W. J. had had a gunshot wound of the cerebral cortex and was suffering from spastic paralysis in the lower limbs and in the left upper limb. The rigidity seen in the lower left limb was so great that when the extended limb was lifted off a horizontal surface the knee remained extended. If the knee were placed in a semiflexed position it would remain semiflexed. When the knee was fully flexed and a knee jerk elicited a greater degree of extension was imposed and maintained. The effect of a

Fig. 10. Illustration of a child seven years old from the after operation. The child could not write legibly before operation.

succession of knee jerks may be illustrated as in Figure 9.

Extension imposed by the active contraction of the quadriceps was maintained with less loss of position than extension carried out passively. In the latter the leg always fell through an arc of 10 or 15 degrees as soon as support was removed. After operation it was found that the extended knee would remain extended momentarily if lifted suddenly and would then gradually fall. If a knee jerk were elicited in the flexed position a movement of extension occurred of much greater amplitude than that seen before operation, but the tendency to maintain the position had been lost and the leg fell almost immediately. This loss of rigidity became more evident at longer interval after operation. There is thus definitely a decrease in the posture maintaining element of tone which depends upon the sympathetic nerves. The element in tone depending upon the medullated nerves and called appropriately contractile tone also becomes less evident. Contractile tone, however, does not disappear after sympathetic ramisection and as in the instance quoted the amplitude of the knee jerk may actually be greater than before operation.

3. *Improvements in muscular control.* Shortly after the operation the first patient described the feeling of freedom in his right lower leg. On the day following operation the control of the right lower limb had improved. The range of movement of each joint gradually became greater and the patient learned to control each individual group of muscle

This continued until the patient began to walk At the end of 12 days he found he could support himself on the right lower limb and a few days later he was able to walk backward He had not been able to do this since the day of his injury 7 years previously On the nineteenth day after operation the patient had so improved as to be able to walk up and down steps using each limb alternatively to negotiate each step From this onward he continued to improve and learned to relax his former spastic limb while walking

In regard to voluntary control the outstanding change that occurred in this patient and in many subsequent patients was that the ability to relax a formerly spastic muscle returned In the patient W J mentioned above whose rigid limb was so altered after operation there was actually no evidence of voluntary control in the left lower limb before operation Fourteen days later however the patient was able to dorsiflex his ankle and to extend his knee but when the knee was extended he could not voluntarily flex it He found however that he had recovered ability to inhibit a contraction of the quadriceps muscle and the knee would fall into flexion Thus was a striking change

My original observation was the apparent failure of reciprocal innervation and the loss of ability to inhibit the muscles opposing the contracting group It appears in such a case as this that the posture maintaining action of the sympathetic nerves when abnormal is not influenced by reciprocal innervation It is possible that normal plastic tone is not influenced by reciprocal innervation but is not present in a degree to obstruct voluntary movement The difficulty of the spastic paralytic is that he cannot freely move from one position to another although he is able to innervate his muscle groups It appears therefore that this abnormal action of the sympathetic nerves in maintaining postures often constitutes the greater part of the patient s disability

4 *Improvement in balance* Disturbance in balance characterizes spastic paralysis in the lower limbs The first patient could not balance on his right lower limb but he found he was able to do so 9 days after operation This experience has been repeated in practically all the operations performed for spastic paralysis in the lower limbs There is a very simple explanation for the improvement Before operation the abnormal plastic or posture maintaining element of tone causes the lower limb to be more or less rigid and the patient cannot change the position of the limb quickly After operation the diminution of rigidity and the increase in control enables the patient to change position quickly and thus compensate for changes in the center of gravity

5 *Tremor and fasciculation* In the first patient a coarse uncontrollable tremor affected the right lower limb before operation when the body weight was imposed upon it and many other patients have exhibited a similar tremor in spastic lower limbs There is also present associated with tremor in spastic paralysis and in a number of other conditions movements of the muscles which may be described as fasciculation These movements appear to be an irregular contraction of muscle bundles and waves of contraction may spring up at various points in a muscle quite independently of one another In many patients limbs affected by tremor and fasciculation also appear to be wasted In flaccid paralysis wasting is now considered to be due to continued fibrillations or independent contraction of each muscle fiber and it is possible that in spastic paralysis of certain types loss of power and wasting is due to continual fasciculation Certainly results that I have obtained substantiate this view In the first patient fasciculation was not observed until after the operation but this appears to have been a clinical oversight because many other patients have exhibited the condition before operation In the first patient both tremor and fasciculation gradually disappeared though a slight degree of tremor remained for some months afterward In many subsequent patients disappearance of tremor has been a pleasing feature and is probably an evidence of the increasing cortical control Fasciculations and tremor appear to me to be undoubtedly due to an irregular discharge through the medullated nerves and a disappearance of these manifestations after operation is due to a depression of hyperexcitability in the centers controlling these nerves

6 Wasting and power An important question that had to be decided before the sympathetic nerves were cut was whether there would be any wasting following operation In the experimental animals observations were made which showed that there was practically no variation in the weight between muscles on a normal side and on the side which had been deprived of its sympathetic nerve supply In one animal which was examined after 73 days the weight of the tibialis anterior and extensor longus digitorum muscles was actually 5 per cent greater than on the normal side The muscles of another animal examined at the end of 12 months were about 1 per cent heavier In the human subject wasting has not been observed to occur after sympathetic ramisection On the contrary in many instances there has been an actual increase in the size and power of muscles released from sympathetic influence Some observations have been made by Dr J I Hunter which indicate that voluntary muscle fibers do not each receive medullated and sympathetic nerve supplies but that there are fibers which receive a sympathetic supply only He has produced evidence to show that these fibers waste after section of the sympathetic nerves but that the fibers supplied by ordinary medullated nerves are not affected If such a thing occurs in a human subject it has no apparent effect upon muscular power and indeed we would not expect such a result since the power of contraction appears to be supplied by fibers activated by medullated nerves

7 Effect upon the control of the viscera An unexpected change occurred after sympathetic ramisection in the first patient This patient had suffered from chronic constipation and found after the operation that this condition had to a large extent disappeared I attribute this effect to the removal of the large white ramus coming from the first lumbar nerve to join the sympathetic trunk Similar effects had been observed in other patients however in which this ramus had been left intact but in my experience the most striking effects occur when this ramus is divided Other patients have reported an increase in control of the sphincter muscles In one or two instances frequency of micturition has also been alleviated In no case has there been any detrimental effect upon the control of the alimentary or urogenital organs even when ramisection has been carried out on both sides In every instance great care has been taken to preserve the fibers directed medially from the sympathetic trunk and the trunk has always been clearly defined before ramisection was attempted It is conceivable that disaster could follow a carelessly performed operation

RESULTS OBTAINED BY LUMBAR RAMISECTION IN VARIOUS LESIONS

The operation of lumbar ramisection has been carried out in 42 instances as follows

a Following gunshot wounds of the cerebral cortex—7 operations

b Vascular lesions of the cortex—9 operations

c Spinal injury—4 operations

d For spinal lesions such as sclerosis—9 operations

e Congenital hemiplegia of infancy—4 operations

f Congenital spastic paraplegia—13 operations

There were no deaths following these operations

The greatest improvements following lumbar ramisection appeared when the operation was carried out for lesions of the cerebral cortex This applied not only to gunshot wounds and other traumatic changes but also to hemiplegia arising from vascular lesion In traumatic lesions of the spine the result varies apparently with the level of the lesion For example a gunshot wound affecting the fifth segment gave a satisfactory increase in control in the right lower limb which was affected A very good result also followed an operation on a patient with the Brown Séquard phenomenon produced by a gunshot wound of the spine at the level of the fifth thoracic segment On the other hand spastic paraplegia caused by a fracture of the spine of the lower thoracic region resulted in improvement but not as great as that seen in traumatic lesions of the upper part of the spinal cord Lumbar ramisection performed for spastic paralysis following progressive changes in the cord due to diseases such as lateral sclerosis or syringo-

myelia has not yielded encouraging results The reason for this will be discussed under indications for operation Results following spastic hemiplegia and paraplegia of infancy certainly justify operative procedures

In one instance a patient suffering from congenital pastic paraplegia was 16 years of age and had never walked Both lower limbs were rigid and the degree of voluntary control was minimal Ramisection was carried out on both sides and 14 days after the second operation had been completed the patient stood and was able to balance for the first time in his life Three days later he walked unsupported This remarkable result can be explained from the fact that the child had been swinging himself around on crutches and his sense of balance was well developed As soon as the rigidity was diminished in lower limbs he was able to counteract changes in the center of gravity The range of movement and control of the various movements in his lower limbs steadily improved and 3 months after operation the boy could walk without any support and with perfect balance

THE OPERATION OF CERVICAL RAMISECTION

The operation of cervical ramisection was performed for spastic paralysis in the upper limb in 33 instances as follows

a Gunshot wound and injury to the cerebral cortex—8 operations

b Paralysis following vascular operations —12 operations

c Congenital spastic hemiplegia upper limb—13 operations

There were no deaths following these operation

The operation of cervical ramisection was performed also in a number of other conditions which will be referred to in a special report

The results following cervical ramisectomy were characterized by the same features as results in the lower limb There was in most instances a great decrease in the rigidity of the limb An increase in the control of movement was also observed In certain cases this return of control was very satisfactory and this particularly applies to paralysis following gunshot wounds of the cerebral cortex and in spastic hemiplegia of infancy The original patient A C had a perfectly useless upper limb Since this operation was performed 6 months ago he has gained the power of opening and closing his *right* hand freely He is now able to supinate though not completely and the movements of the shoulder are continually improving in control and in range In several instances the control of intrinsic muscles of the hand improved almost immediately after operation One very striking result which has been particularly observed in children is the ease with which supination is performed after the operation The specimen of hand writing illustrated in Figure 10 is that of a girl aged 9 suffering with congenital spastic hemiplegia The writing was done 9 months after operation Previously her hand writing was illegible Progressive improvement is reported by every patient of this type

The least satisfactory results are obtained in paralysis of the upper limb following vascular lesions of the cerebral cortex and this applies particularly to the fine movements of the hand Improvement invariably occurs however in the control of the movements of the larger groups of muscles For example one patient whose upper limb was kept rigidly flexed for 25 years and had not the least sign of active movement learned to abduct the shoulder to flex the elbow and to extend the wrist within 14 days after operation It is particularly necessary to emphasize however that the prognosis as regards recovery in cerebral lesions is not good when the patient has lost all idea of controlling the muscle groups in the hand Control of movement in the hand is such an intricate mental process and depends so much upon the correct initiation and propagation of nervous impulses that it is difficult to re establish control

THE REMOTE EFFECTS OF SYMPATHETIC RAMISECTION

Unexpected effects have been reported by patients in connection with the operation upon the upper limb In several instances an internal splint associated with general spastic hemiplegia disappeared gradually after operation The control of the muscles of the face and facial appearance have often definitely improved For example several patients had been unable to close the eye on the affected side before operation but have reported the return of this power after operation Sometimes independent action in closing each eye

was impossible before but was restored after operation In a number of these patients the eyelid drooped for some time following operation *and the pupil became more contracted* than on the opposite side Almost invariably the upper lid resumed a normal posture though in a few instances the pupil remained smaller in size than on the normal side The change in the pupil and in the muscles of the eye is probably due to the division of the white ramus from the first thoracic nerve It is not always easy to distinguish between the white and gray ramus of this nerve and in some cases the white ramus was divided In certain operations it is also possible that the cervical sympathetic trunk *is subjected to pressure leaving a temporary* depression of function In several instances even when ocular symptoms are not present the face takes on a more relaxed posture and this adds to the patient's comfort in that the signs of paralysis are not so evident The coldness and clamminess of the spastic limbs also disappears and there is in almost every instance a decrease in the activity of the sweat glands In the lower limb on several occasions patients have reported a tendency for the skin to desquamate One patient said this occurred about every 6 weeks but very few patients have noticed this effect The same patient referred to above thought his nails had become more brittle He had no discomfort in the limb and was very pleased with freedom from profuse perspiration

In a number of instances it has been noticed that improvement following ramisection on one side has been followed by improvement on the opposite side before the second operation has been performed And again improvement on the first side is augmented when the second operation is performed This is probably due to the decrease in reflex activity through cutting out one of the reflex arcs One patient reported relief from stuttering which was present before the onset of spastic paralysis

Part V The Influence of Structural Changes Upon the Results of Operation

In paralysis of long standing adaptive structural changes obstruct early and complete freedom of movement For example the presence of pronation deformity retard the acquisition of supination In some cases this is only a temporary retardation and the patient is able to overcome the deformity voluntarily In other instances additional mechanical or operative treatment has to be undertaken to produce *the full benefit of ramisection* This is usually confined to correction by plaster of Paris or to simple tenotomy In younger patients it is advisable to allow return of function to correct deformities as far as possible without further interference In older patients where the paralysis has existed for 20 or 30 years a striking result cannot be expected on account of structural changes but the result can often be improved by additional *operative treatment*

Part VI The Indications for Operation

Defective cortical control releases the subcortical centers from the effects of cortical inhibition and one expression of their independent activity is the hypertonicity of the muscular system If the release from cortical control is complete enough and has continued *for sufficient length of time muscular rigidity* may result Thus in the spinal animal the mechanism of the spinal cord causes hypertonicity and a type of rigidity In the acute condition in the spinal animal the removal of the sympathetic nerves leads to an alteration of the characteristic posture of flexion but no animal was observed for longer than about 3 weeks It is not unlikely that observations in a chronic state would reveal that the tendency *of the spinal mechanism to impose flexion pos*ture would assert itself Clinical results of ramisection indicate that uninhibited spinal activity extending over a period of years can impose rigidity which is unaffected by removing plastic tone The only conditions in which the removal of the sympathetic nerves can have much effect in spinal lesions is when there is enough cortical control to inhibit excessive contractile tone If for example lateral *sclerosis has advanced so far* that cortical influence upon the spine is minimal then the spinal mechanism in control of the situation The removal of the sympathetic influence may lessen reflex activity but there cannot be any

substantial gain in the control or the power of movement on account of the nature of the lesion The position is still more hopeless if muscular wasting and loss of power are present In lesions which are not progressive such as traumatic sclerosis the result of ramisection will depend upon the ability of cortical impulses to pass the pathological block

CONDITIONS RESEMBLING DECEREBRATE RIGIDITY

Clinical conditions resembling decerebrate rigidity are not amenable to treatment by sympathetic ramisection One characteristic of the decerebrate animal in the acute condition is the tendency for the limb to assume the posture of extension It is not unlikely that a chronic decerebrate condition would reveal a much more constant extension than that seen in the acute state Clinical conditions are seen in which the picture is made up of absence of cerebral control together with hypertonicity of the muscles and constant extensor spasm These do not yield a satisfactory result The extensor spasm remains practically unaltered In these and similar cases rigidity of extensor type is constant because of the release of function in the centers concerned with the contractile tone of the antigravitational muscle In the presence of greater cerebral control the extending tendency may be inhibited and be replaced by a fixed plastic rigidity such as that seen in the spastic paraplegia of infancy This affects the possibility of treatment since clinical experience shows that in the absence of any definite tendency for the flexing or extending muscles to undergo reflex contractions and impose positions the rigidity is due to the sympathetic nerves

The effects following sympathetic ramisection for spastic paralysis caused by cerebral lesions indicate that the site and severity of the lesion modify the result When the paralysis is due to trauma of the actual cortex favorable results may be expected if the remaining cortical control is adequate Spastic paraplegia and hemiplegia of infancy must be judged according to the mental condition of the patient and by the presence or absence of muscular control Plastic rigidity may however mask the degree of control present and it is not always easy to predict the improvement likely to occur The prognosis in lesions of the internal capsule and indefinite lesions associated with vascular changes is not good as regards recovery in the upper limb

THE CLINICAL MANIFESTATIONS OF PLASTIC TONE

The chief indication for operation in spastic paralysis is the presence of excessive plastic tone This is manifested clinically by the behavior of the muscles in certain clinical tests For example under normal circumstances the knee jerk can be shown to hesitate at the point of maximum excursion but this hesitation is hardly appreciable to the eye This hesitation is due to a shortening reaction in the quadriceps muscle and in spastic paralysis I have observed the shortening reaction to cause the position of extension to be maintained for seconds or longer in an exaggerated knee jerk This is due to excessive plastic tone and disappears after sympathetic ramisection Sometimes as in a complete transverse spinal lesion the knee jerk is exaggerated and the limb will exhibit a clonus in the extended position which maintains extension This is due to excessive contractile tone and may or may not disappear after operation according to the amount of plastic tone present Another method of testing is to watch the action of the tendons of the dorsiflexing muscles of the ankle joint on releasing the foot after passive dorsiflexion If plastic tone is excessive the tendons stand out prominently and the foot falls slowly into plantar flexion This test must be used with caution when the habitual attitude of the foot has been plantarflexion Muscle tone is never so great even in hypertonic conditions that all slack disappears in tendons when the attachments of a muscle are approximated If the habitual attitude of the ankle has been plantarflexion the tendons will become prominent only when the dropping foot begins to extend the relaxed tendons The initial spring into prominence is due to contractile tone and can be seen in both active and passive movements after plastic tone has been removed The characteristic hesitation of movement will not persist unless the plastic element of tone be increased

The absence of adequate cortical control of movement is in most cases a contra indication for operation and this must be clear for two reasons In the first place lack of cortical inhibition allows excessive contractile tone to develop through the release of function in the lower centers and secondly no improvement in corticospinal connections can be expected to follow the removal of the sympathetic nerves unless excessive plastic tone is the factor nullifying the effect of cerebral control

Imbecility is an absolute contra indication and some degrees of feeble mindedness should be similarly considered It is possible that any factor which restores the control of movement will improve mental deficiency but the degree of deficiency should be carefully considered before treatment is advised [1]

Part VII Postoperative Treatment in Spastic Paralysis

The treatment of spastic paralysis by sympathetic ramisection is sufficient in a few instances to allow the patient to move freely after operation In the greater number educative or re educative measures must be employed The process of physical education in the normal individual is complete only when there is accurate cortical representation of the movement of each group of muscles The early reflex movements of the infant have to be analyzed by the growing intelligence until group control is acquired New purposeful co-ordinated movements are then learned by combining the movements of groups of muscles When the spastic paralytic is relieved of the obstruction to movement presented by excessive plastic tone the control of muscle group will very rarely be found to be present Such movements as flexion or extension of the whole lower extremity are commonly present and for this reason patients will learn to walk in a manner long before group control is established The educative process must be persisted in until group control is established for it is only in this way that alterations in gait can be made For example it is very necessary that flexion of the hip and of the knee be accurately acquired so that the exact amount of flexion of the hip to carry the whole limb forward can be combined with the appropriate amount of flexion of the knee for the foot to clear the ground

A very important feature of the educative process is to minimize the patient s mental effort Under ordinary conditions the spastic paralytic has not only to overcome the action of gravity in lifting his limbs but has also to overcome the resistance offered by the uninhibited tone of the muscle groups antagonistic to those performing the movement This obstruction from tone is very much lessened by operation but the mental habit of excessive innervation persists The first point is therefore to minimize the mental effort and the second necessity is to eliminate the contraction of any unnecessary muscle groups This goes a long way toward the establishment of accuracy both in the control of muscle groups and in co-ordinated movements

The re educative process is usually more easily accomplished in that cortical representation has been already developed The pictures of movement become indistinct after years of disability but a greater difficulty occurs when substitution movements have become established These are only eradicated by the teaching of group control followed by the practice of correct co-ordinations

Massage and Electrical Treatment

There is very little to be gained from the use of massage and electrical treatment in spastic paralysis All forms of irritative electrical treatment are decidedly contra indicated on account of the tendency to increase the reflex activity of the spinal cord Education and re education are psychological processes and the mere production of muscular contraction by electrical stimulation is really beginning at the wrong end Massage may have a use in improving the condition of muscles underdeveloped from disuse but should be employed with caution The whole object of peripheral treatment is to depress the activity of the nervous mechanism causing hypertonicity and this will be best accomplished by leaving the muscles unirritated The lighter forms of massage may sometimes be employed with advantage to bring about muscular relaxation

THE INFLUENCE OF THE SYMPATHETIC NERVOUS SYSTEM IN THE GENESIS OF THE RIGIDITY OF STRIATED MUSCLE IN SPASTIC PARALYSIS[1]

By JOHN I HUNTER M D Ch M Sydney Australia
Challis P f sso f An t my U ty f Syd y H y C lt g N l g t L w h m H p t l Syd y

In a paper read before the Royal Society of London in 1896 Professor C S Sherrington (46) called attention to a condition of plasticity of the skeletal musculature of the monkey which supervened upon careful removal of both cerebral hemispheres He described for instance the special characters of the reflex movement of the upper extremity consisting of a forward step in quadrupedal progression which occurred following the application of a stimulus such as heat to one of the fingers of the hand of an animal in this condition He recorded that the latent period of this movement was variable but usually prolonged and that the movement itself was of steady and smooth performance He went on to say the most striking feature of the reflex is however that when the actual movement has been accomplished the contraction of the muscles employed in it does not cease or become superseded by the action of another group but is continued even for 10 or 20 minutes at a time The new attitude of the limb is maintained and that too without clonus or even tremor Sherrington contrasted this cataleptoid effect exhibited by the decerebrate preparation with the short lasting character of the movements executed as a result of purely spinal reflex action in the spinal animal

THE PROPERTY OF PLASTIC TONE OF SKELETAL MUSCLE

Sherrington succeeded later in evoking the cataleptoid effect simply by placing the limb in the desired posture (49) He employed in these studies a mammalian preparation with mid brain transected in which all the muscles and nerves of the hind limb except the vastocrureus and its nerve supply from the femoral nerve were dissected away He showed that the decerebrate vastocrureus along with other antigravity muscles exhibited two converse reactions If starting from the extended position characteristic of the decerebrate posture the observer forced the knee into flexion the vastocrureus remained fixed after the stretching force had ceased at a new and increased tonic length If the knee were now passively extended subsequent to the execution of the movement the extensor muscle remained fixed at a new and shortened tonic length These are respectively the lengthening and shortening reactions This property was exhibited not only after forcible flexion of the extended limb but in the phases of spontaneous relaxation from the extended posture which alternate with the periods of rigidity Their discoverer called the state of the muscle exhibiting these reactions plastic tonus

It is important to notice that Sherrington (loc cit p 144) also showed that the tonus could support approximately the same weight when it kept the muscle in the shortened state (knee extended) as in the lengthened state (knee flexed) The tension of the muscle remained approximately unaltered over a wide range of different lengths of muscle In other words the degree of plastic tone of the muscle is independent of the length at any given time of the muscle fibers composing the muscle In this respect Sherrington (49 50) and others have shown that the reactions of skeletal muscle resemble the properties of smooth muscle for the latter also can quite readily adjust itself to different lengths while counteracting one and the same load Sherrington aptly illustrates this point by reference to the urinary bladder If skeletal muscle exhibiting the lengthening and shortening reactions were wrapped round a sac it would like the involuntary muscle of the bladder wall be able to adjust itself to varying capacities without material alteration of the wall tension

[1] Th J h B M rphy Ora io in S g ry prese ted befor th Clinical C gress f Americ Co'lege f S geon New Y k Oct be 9

Sherrington (49) succeeded in abolishing the 'shortening and lengthening reactions of skeletal muscle by severing the posterior nerve roots of the spinal segments connected with the muscle He proved that plastic tone depended on the existence of a proprioceptive reflex mechanism In this experiment the autogenous impulses from the muscle were prevented from discharging reflexly through the efferent pathways to endow the property of plastic tone upon the muscle Sherrington believed that somatic motor nerves formed this efferent connection The experimental work and human operations of Dr Royle (44) on the other hand have shown that the efferent limb of the reflex arc subserving plastic tone consists of the non medullated postganglionic fibers of the sympathetic nervous system These reach the skeletal muscles by way of the gray rami communicantes

SYMPATHETIC INNERVATION OF SKELETAL MUSCLE

In 1879 Tchiriew (52) showed that there were two types of terminal plates in the skeletal muscles of snakes In addition to the ordinary motor end plates he found grape like terminations which were apparently motor in character Tchiriew demonstrated that transitional forms tended to link these two types together and came to regard the *terminasions en grappes simply as immature forms of the* cerebrospinal motor end plates This interpretation did not excite any great interest Tchiriew noticed however a circumstance of great importance in connection with the two types of terminations namely that the terminasions en grappes were associated with non medullated nerve fibers while the motor end plates were the terminations of medullated nerve fibers This specific difference between the two sets of nerve fibers led to the inquiry as to whether the two types of end plates were also specifically different from one another The answer has been given during the last decade by the application of the experimental method to the elucidation of morphological problems The following are two reliable experiments Boeke (8) found in cats that 3 weeks after section of eye muscle nerves near their origin from the brain stem many non medullated fibers had resisted degeneration He rightly concluded that these were sympathetic fibers from the cervical sympathetic chain which had been transferred to the eye muscle nerves distal to the point of experimental section of these nerves Boeke performed the converse experiment of removing the superior cervical ganglion but beyond the fact that the author was able to record the impression that the non medullated fibers were fewer in number at the end of 2 weeks this experiment was unsuccessful Adadhr (2) on the other hand after removal of the ganglion stellatum in a cat was able to find on killing the animal 6 days later the remains of degenerated non medullated nerves supplying skeletal muscles of the fore limb It must be accepted therefore that some at least of the non medullated fibers found supplying skeletal muscle take their origin from the vertebral ganglia of the ganglionated sympathetic chain To employ the terminology of Langley (31) who confines the term sympathetic to the thoracolumbar outflow the skeletal muscles receive postganglionic non medullated fibers of the sympathetic nervous system by way of the gray rami communicantes In addition of course the muscle receives the ordinary cerebrospinal nerve fibers of somatic origin In this sense skeletal muscle has a double innervation

RELATION OF THE DOUBLE INNERVATION TO THE TONE OF SKELETAL MUSCLE

In 1913 as the result of experiments on frogs de Boer (13) claimed to have shown that the tonus of the hind limbs disappeared when the rami communicantes of the sympathetic ganglia were severed and deduced that muscle tonus was exclusively governed by the sympathetic nervous system In 1915 Langelaan (28) differentiated between two elements of tone He suggested that one component of the tonus the plasticity is controlled by the sympathetic system and the other component the contraction remains under the control of the motor cells of the anterior horn On repeating de Boer's experiment on frog Langelaan (29) showed that plastic tonus disappeared after removal of the

sympathetic innervation of the hind limb but contractile tonus remained He defined plas tic tonus as that state of the muscle in which it has the properties of a plastic body and contractile tonus as the property of muscle enabling it to maintain a state of slight con traction He used the word tonus as the general term comprising both plastic and con tractile tonus

This view has been severely criticized At the Eleventh International Physiological Con gress in 1923 Professors Botazzi and Hess (10) reported that they had been unable to find that interference with the sympathetic system had any effect on the tone or nutrition of skeletal muscle Adrian (1) in reviewing this question in 1920 came to the conclusion

There is no doubt that the skeletal muscles are connected to the sympathetic system but the sympathetic fibers are not concerned with tone

The strongest argument in favor of this view has been that section of the gray rami communicantes to the nerves of the hind limb failed to prevent the onset of decerebrate rigidity or consistently to diminish the tone of the skeletal muscles of the limb in that con dition After summarizing the experiments of Cobb (11) and others in this connection Adrian says It appears then that although removal of the abdominal sympathetic chain is occasionally followed by a diminution of the tone on that side yet in the majority of these experiments the loss of the sympathetic sup ply makes no difference the rigidity is devel oped and maintained as well on the operated as on the intact side

Although Langelaan (28) stated in 1915 that it was probable that one of the com ponents in the decerebrate rigidity is a pa m of sympathetic origin cau ed by the prevail in of the cerebellum he did not prove thi thesis experimentally

Dr Royle s experiments on goats are con clusive on this point Where decerebration was performed ome time e g 73 days after removal of the lumbar portion of the sym pathetic chain on one side deviations from the usual condition of decerebrate rigidity in the hind limb on the side operated upon were observed The e differences occurred both in the phase of extensor rigidity and in the phase of spontaneous relaxation of this condition This limb is capable of assuming the extended posture but the amount of force required to flex the limb passively is small compared with the force necessary to flex the opposite hind limb The limb is not rigidly maintained in the extended posture for long periods of time as are the other three limbs It tends to fall into a position of semiflexion and abduction which is determined by gravity and the in herent equilibrium length of the fibrous tis sues composing it Examination of the limb in this condition reveals the fact that plastic tone is absent for the lengthening and shortening reactions are not exhibited (19 20) This conclusion has been amply con firmed by the results of the operations of sympathetic ramisection obtained by Dr Royle in patients suffering from spastic pa ralysis

The absence of plastic tonus is responsible for the observation that the phase in which the limb on the side operated upon remains extended is short lasting for the mechanism is removed which enables the muscle fibers to remain fixed at the length required to maintain this position No true rigidity there fore develops Contractile tone by acting differentially on the extensor muscles imposes the extended position upon the limb but in the absence of plastic tone this position is not maintained Contractile tone which remains after sympathetic ramisection is a function of the somatic proprioceptive mechanism

These two components of tone also confer natural attitudes upon the intact animal When normal goats like many other animals are placed in the supine po ition they assume the defensive posture of extension Dr Royle (44) found that this position was less con sistently maintained by the limb which had been deprived of its sympathetic innervation Thi limb tended to fall into a semiflexed and abducted position Langelaan (29) has shown the effect of sympathetic ramisection upon the hind limb of the frog to be of a similar nature If compensatory effects from the labyrinth be excluded the limb on the side operated upon fail to maintain itself in the full degree of flexion characteristic of the natural attitude

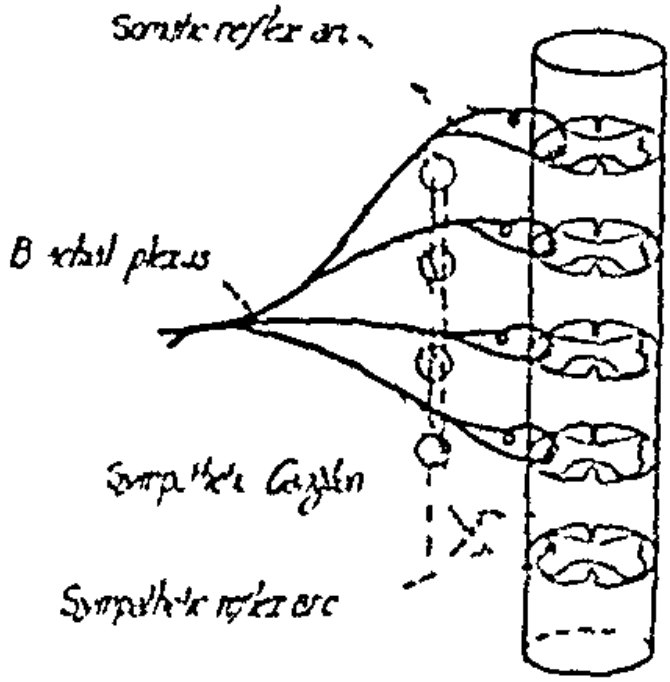


Fig. Schematic representation of the wing of the fowl. It is to be noted that somatic reflex arcs and the sympathetic reflex arcs are at different level of the spinal cord.

of the animal and return more nearly to its inherent equilibrium length than the normal limb. I have been able to show also that a similar effect occurs in the wing of the fowl upon section of the cervical sympathetic trunk immediately caudal to the roots of the brachial plexus. The flexed and relaxed position characteristic of the wing at rest is now no longer fully maintained for plastic tone is absent but the tendency to assume the flexed position due to contractile tone is still retained. Precisely the same effect as that which follows section of the cervical sympathetic trunk is produced by section of the posterior nerve root of the segment (first thoracic) immediately caudal to the origin of the root composing the brachial plexus. In this way proprioceptive impulses are removed. These experiments together prove that the plastic tone of the wing is subserved by a proprioceptive reflex mechanism, the afferent and efferent limbs of the reflex arc being at the level of the first thoracic segment (Fig. 1). The somatic reflex arc subserving contractile tone are situated cranial to this level.

On account of this arrangement the converse experiment may be performed of severing the posterior nerve roots of the segments of origin of the brachial plexus. By this procedure contractile tone is removed and the wing has therefore no tendency to take up the usual folded position. On the other hand, due to the presence of plastic tone the wing will remain in any position in which it is passively placed. It will maintain the normal position if placed in that position (Fig. 2) equally well it remains dependent if it be drawn down to its full extent (Fig. 4) or to any intermediate position (Fig. 3). In other words the flexor muscles exhibit the shortening reaction and the lengthening reaction. If now the cervical sympathetic trunk be severed caudal to the roots of origin of the brachial plexus these reactions disappear. This is conclusive proof that plastic tone is subserved by the sympathetic innervation of the skeletal muscles of the wing.

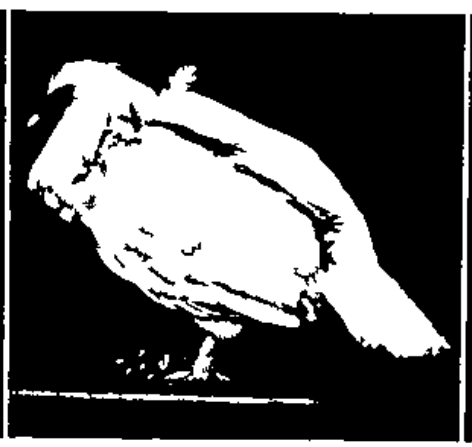
These experiments show that skeletal muscle is under the influence of two proprioceptive reflex arcs, somatic and sympathetic. On account of the limited origin of the sympathetic system the spinal connections of these arcs are situated often at different levels of the spinal cord. For instance as shown above the somatic arc is in the lower cervical and the sympathetic arc in the thoracic region in the case of the wing of some birds (Fig. 1). *Of which of these arcs are responsible for the tone of skeletal muscle.* Contractile tone subserved by the somatic arc acts on certain muscles only, while their antagonists are reflexly inhibited. This element of tone therefore imposes a posture on the part. Plastic tone, a function of the sympathetic arc, maintains this posture once assumed by maintaining the length of fiber of the muscles which exhibit contractile tone. In this sense both *are postural in function*, and it may be referred to as postural contraction (Sherrington, p. 190).

The term postural tone should be used to indicate the combination of contractile and plastic tone which are together responsible for the postures imposed by skeletal muscle.

Postural tone is concerned with the active maintenance of a posture against such forces as gravity which tend to impose a passive posture on the part. Sherrington (loc. cit.) has described such active posture as those



Fig 2



Fi 3



F g 4

F g Th wi g of fowl in e t d by the sympath t ic n r u sy tem o ly Cont a t le t was em d by se e ng th p te r n e oots f th somatic r fle arcs Pl st c tone was st ll pre t The wing wa m lded p s i ely i to ts rm l po iti d ema ned the

Fg 3 The am f wl in F gure w th the t m n l segme t f the wi g p w lv d a m f w d O c t of the p e ce of plastic t e this w position s mai tained

Fig 4 The me f l n the p e iou two figu es with th wi g placed depende t positi n by p ive mo em t Pla tic to e ma nt in it n this p s tio con tractile t n b ng ab e t there i n te d cy fo the wi t tak up the no mal folded tt tude

reactions in which the configuration of the body and of its parts is in spite of forces tending to disturb them preserved by the activity of contractile tissues these tissues then functioning statically

THE RELATIONSHIP OF SYMPATHETIC NERVE TERMINATIONS TO INDIVIDUAL SKELETAL MUSCLE FIBERS

Boeke s extensive researches as Wilson s review (66) of the subject of double innerva tion indicates have been responsible for the general acceptance of the view that the sym pathetic nervous system sends non medullated nerve fibers to skeletal muscles He believes (6 7) that each skeletal muscle fiber receives a branch of the sympathetic plexus of non medullated nerve fibers which are found run nin between the muscle fibers Agduhr (2) supports this view He reports finding the sympathetic termination of a non medullated fiber on the same muscle fiber as a somatic motor end plate The medullated fiber to the latter had degenerated on account of experi mental section of the spinal nerve roots having been performed some days previou ly If thi view is correct then Langelaan s scheme (28) to correlate these facts with the dual struc ture of muscle fibers is worthy of considera tion Following Boeke he believed that the somatic motor fibers terminated in the ani o tropic discs and that the non medullated sympathetic fiber terminated in the sarco plasmic mass in which the striped apparatus is embedded Botazzi (9) has claimed that the sarcoplasm performs tonic contraction and supports the anisotropic substance in its quicker contraction According to this con ception the sarcoplasm subserves plastic tone and is innervated by the sympathetic ending and contractile tone is due to a slight degree of contraction of the striped apparatus which is under the control of the motor cell of the anterior column of gray matter of the spinal medulla

According to this theory sympathetic rami section consists in depriving the sarcoplasm of each individual muscle fiber of its nerve supply

In contradistinction to the findings of Boeke and Agduhr Perroncito (39) states that in reptiles the same muscle fiber never receives an ending *en plaque* and an ending *en grappe* In fact he argues from this that the grape like terminations must be motor in character for each muscle fiber must receive at least one motor ending This observation is the more interesting because Kulchitsky (27) working on the python has this year emphasized the point that the medullated and non medullated nerve fibers never end in the same muscle fiber Dr Oliver Latham of Sydney work

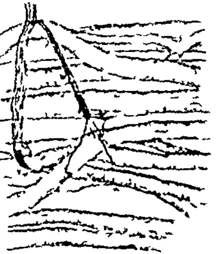


Fig. 5. [illegible] Latham.

ing with gold chloride preparations of the skeletal muscle of the domestic fowl and the goat, has not found an instance of both types of termination on the same muscle fiber (Fig. 5). Obviously this finding, if confirmed, carries with it an entirely different conception of the neuromuscular mechanism providing the two components of postural tone. It would appear that some muscle fibers which are innervated by somatic motor fibers exhibit, due to reflex activity, a degree of contraction and provide contractile tone. These muscle fibers also actively contract during voluntary movement. Other muscle fibers under the influence of sympathetic endings are lengthened and shortened during the process of active or reflex contraction, and remain fixed at the new length so acquired. They are responsible for the plastic tone of skeletal muscle.

This conception approaches closely the functional duality theory of Gruetzner (16). He believed that in skeletal muscle one set of muscle fibers formed an intrinsic support for those fibers which were in active contraction.

It is especially illuminating in view of the fact that in invertebrates, e.g. bivalve mollusks, two separate muscles are found specialized to perform the functions of movement and fixation respectively. The movement muscle is capable of active contraction. The fixing muscle maintains the posture assumed as a result of the activity of the movement muscle. I believe that the skeletal muscles of vertebrates combine two sets of fibers which are homologous with these separate muscles of invertebrates. The histological and experimental evidence in favor of this view is discussed fully elsewhere (Hunter and Murray 23).

According to this conception the operation of sympathetic ramisection deprives the fixing muscle fibers of their sympathetic nerve supply. In the absence of innervation these fibers are incapable, after a time at least, of exhibiting the property whereby they may remain fixed at any given length. In consequence the entire muscle is deprived of plastic tone.

THE POSTURAL INFLUENCE OF THE SYMPATHETIC NERVOUS SYSTEM ON SMOOTH MUSCLE

1. Circulatory muscle. The tonus of smooth muscle differs markedly from that of skeletal muscle in that it is manifested apart from the impulses from nerve centers (cf. Bayliss 4, p. 532). After section of the sympathetic vasoconstrictor nerves a state of moderate contraction still remains which increases during a period of some weeks to become nearly equal to the original condition. Sympathetic ramisection unquestionably leads to a certain degree of vasodilatation and increase in size of the limb and the procedure may be practised instead of periarterial sympathectomy to remove vasoconstriction. In Dr. Royle's first two patients (44) these vasomotor changes were considerable only in the first week and had practically disappeared as far as palpation could reveal at the end of 2 weeks. Incidentally this fact renders untenable Kuno's explanation (69) that all the changes of tone seen in a limb deprived of its sympathetic innervation are to be accounted for by the increased blood supply for 12 months

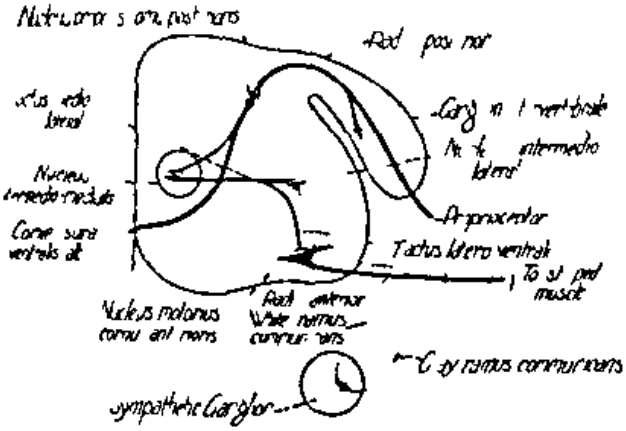


Fig 6 A sch m rep es nt g the p nal c nne ti n of p opriocepti e fibers from kel tal m cl (La g l n a d B k)

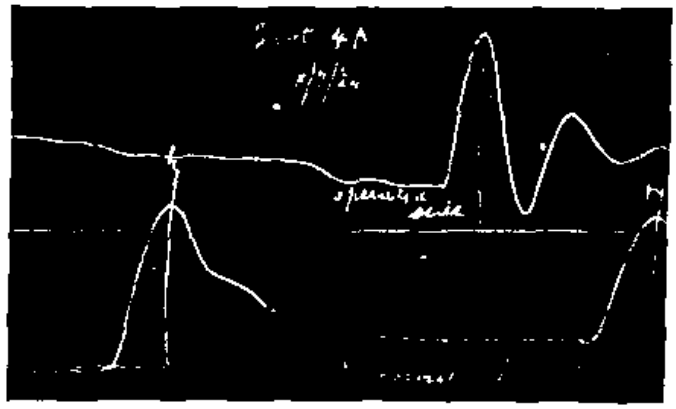


Fig 7 Graph c rec d f the knee jerk n th goat The l e graph h s th norm l sid th je k be ng l cited with th thigh f ll flexio It hows a p olo ged phase f r la ti The pper graph shows the knee j rk the th r sid t ke on th same day—three days fter ympath tic r m ection N te the rap d ty of th laxat n aft the ontra t on phase (Reproduced by courtesy f M s I S Cotton a d R E Murr y)

have now passed since the first operation was performed and the change in tone has persisted Not only does recovery in the tone of circulatory muscle occur after sympathetic denervation but freshly excised arteries have been shown to be capable of exhibiting different diameters under the same wall tension (cf Sherrington 50 p 224) Though this is the case it is probable that living arteries with their sympathetic nerve supply intact exhibit this property to a greater extent Krogh (26) has demonstrated that the regulation of the caliber of capillaries is very imperfect when their contractile cells of Rouget have been deprived of their sympathetic nerve supply States of strong contraction alternate with complete relaxation In this instance therefore the function of the sympathetic nerve supply of circulatory muscle is postural The neuromuscular mechanism concerned in the regulation of caliber is comparable to that responsible for the maintenance of the plastic tone of skeletal muscle

2 *Visceral muscle* Sherrington (50) has applied the term posture to the property of smooth muscle of the hollow viscera which enables these organs to act as a reservoir for contents of increasing volume without the occurrence of a proportionate increase in wall tension This property is retained to some extent by the excised organ but it is not nearly so adequate as when the nerve supply is intact The sympathetic innervation of the muscle is responsible for this postural function (18 19) When released from control as in cases of spastic paralysis the sympathetic nerve supply of the smooth muscle of a hollow viscus enables the muscle to assume postures to accommodate increasing contents under the same wall tension to a greater degree than is normally the case The adequate stimulus for emptying which is effected by the parasympathetic nerves is therefore not attained within the usual limits and in the case of the bowel constipation results Experimentally it may be shown (18 19) that removal of the sympathetic nerve supply to the bowel under these conditions enables the parasympathetic nerves to function when the contents are considerably less than under the abnormal conditions previously existing The effect of this procedure on the bladder may be to cause frequency of micturition but this is transitory On this account as the result obtained in Dr Royle s first patient indicates it is justifiable to remove on one side only the sympathetic nerve supply (hypogastric nerves) of the sigmoid colon and rectum The effect on the bowel may be produced by severing the white ramus from the first lumbar nerve to the uppermost lumbar ganglion or by removing the hypogastric nerves themselves as they pass medially from the lumbar sympathetic trunk or by severing the trunk proximal to the origin of some of the hypogastric nerves instead of below the fourth lumbar ganglion which is the usual procedure (2 45) It is evident on the other hand that the lumbar operation may be

confined to section of rami communicantes below that of the white ramus of the first lumbar nerve above mentioned and the sympathetic visceral nerves are consequently left intact This enables the bilateral operation to be performed in cases of paraplegia without affecting the bladder and bowel Similarly gray rami communicantes are alone removed in cervical ramisection In both the lumbar and cervical operation therefore only the sympathetic innervation of the skeletal and circulatory muscle of the limb need be removed (2)

THE CONNECTIONS OF THE SYMPATHETIC REFLEX ARC SUBSERVING PLASTIC TONE OF SKELETAL MUSCLE

It has been shown that a sympathetic reflex arc subserves the function of plastic tone of skeletal muscle Langelaan (9) in collaboration with Bok has evolved a scheme of the primary spinal reflex arcs to explain the relationship between the proprioceptive pathways and the somatic and sympathetic motor mechanism connected with skeletal muscle These connections are reproduced here as Figure 6 It will be seen that these observers believe that a group of cell (nucleus intermedio-medialis) receives the proprioceptive impulses from the cells of the posterior column of gray matter This nucleus is then connected with both the sympathetic efferent group of cells (nucleus intermedio lateralis) and the somatic motor cell of the anterior column of gray matter The somatic motor fibers proceed direct to the muscle The axons of the sympathetic efferent cell pass by way of the white ramus communicans to a sympathetic ganglion the postganglionic fibers reach the muscle by way of the gray ramus communicans which joins the spinal nerve

This scheme also depicts commissural fibers from the cells of the posterior column of gray matter which pass through the ventral white commissure The physiological evidence which follows indicates that such a path may convey impulses subserving the plastic tone of the musculature of the opposite side of the body I have been able to show for instance that bilateral increase of the plastic tone of the wings of birds follows removal of the major part of one cerebral hemisphere This rigidity is greater on the ipsilateral side Now removal of the sympathetic nerve supply to the wing on this side by severing the cervical sympathetic trunk caudal to the brachial plexus removes the rigidity not only of this wing but that of the opposite side also Clearly the afferent impulses from the one wing are responsible for the excess of plastic tone of the opposite wing This effect is strikingly displayed in some of the cases of paraplegia operated upon by Dr Royle who first called my attention to the possibility of the explanation given here Lumbar sympathetic ramisection on one side has greatly diminished the rigidity of the lower extremity of the opposite as well as of the same side

Intersegmental connections also convey proprioceptive impulses which increase the plastic tone of musculature innervated from higher or lower levels of the spinal medulla Lumbar ramisection may diminish the rigidity of the upper extremity on the same side The improvement in speech effected in some patients with spastic paralysis who have been subjected to the operation of cervical ramisection is probably also due to the fact that intersegmental connections convey proprioceptive impulses from the limb musculature to the motor nuclei of the brain stem which supply the musculature of the tongue larynx and face

In mammals spinal connections alone are not adequate to maintain the normal degree of plastic tone exhibited by the skeletal musculature Sherrington's (49) experiment upon the spinal animal are clear evidence of this fact

The spinal animal does not exhibit the lengthening and shortening reactions indicative of the presence of plastic tone immediately after spinal transection In Sherrington experiments on dogs the shortest period after the operation in which he found these reactions present was 16 days and in this case they disappeared to return at the end of a month after the time transection was performed In the early days following thoracic spinal transection the hind limbs hung almost flaccid with both knees equally flexed under the action of gravity (49 p 111)

Pike (40) has pointed out that there are two possible explanations of this condition which is usually designated spinal shock First the conductivity of the spinal reflex arc may be maintained by impulses descending from higher levels or second the function of the morphologically old spinal pathways may have shifted to higher levels so that a period of inactivity supervenes upon spinal transection According to the latter hypothesis it requires some time for the pristine functions of these persisting spinal reflex arcs to be assumed This view explains the increasing severity of spinal shock in the ascending vetebrate series the smaller degree of spinal shock in young animal and the presence in the second stage of complete transverse lesions of the cord of reactions of the caudal segment of the spinal medulla which are not obtainable in the intact animal The phenomenon of spinal shock is due to the isolation from higher levels of activity of morphologically persistent pathways which are relatively inactive in the intact animal We have suggested (24) therefore the term isolation inactivity as being more appropriate for this condition

Sherrington (50 p 08) has called attention to the existence of the two possibilities mentioned by Pike in reference to the question of the pathways responsible for plastic tone Normally some prespinal center or probably several centers is adjuvant either in the sense that the postural reflex beside employing the spinal centers employs the prespinal as well or in the sense that the spinal centers which the reflex employs are kept up to the mark for that reaction by influence exerted on them by prespinal The evidence mentioned above is in favor of the possibility that plastic tone is subserved by a prespinal reflex arc and that the primary spinal sympathetic reflex arc is a morphologically persistent pathway not actively functioning of itself in the intact animal

No matter which is the explanation It certainly appear from Sherrington s researches that as we ascend the animal scale the spinal component of muscle tone becomes progressively more subordinate to the prespinal and of less importance (Walshe 59 p 48) In man the sympathetic spinal reflex has little if any value in the maintenance of plastic tone The reactions of spinal man are clear evidence of this (cf Walshe 59 Riddoch 41)

It is interesting to recall the fact already noted that Sherrington contrasted the long lasting effect of a reflex movement of the decerebrate animal in which a posture is maintained for long periods of time with the short lasting character of the reflexes of the spinal animal

Obviously therefore reflex flexor movements which are spinal in origin and subserved by somatic connections may occur in cases of spastic paralysis in the absence of plastic tone Hyperactive tendon reflexes alone do not constitute an indication for sympathetic ramisection The essential indication is increase in plastic tone Unless this element of tone be exaggerated rigidity is usually not a marked feature of the spastic limb and sympathetic ramisection is of no avail But if exaggerated tendon reflexes and increased plastic tone are both present removal of the latter element may indirectly cause a diminution in reflex activity The record of Dr Royle s first patient (44) on whom lumbar ramisection was performed upon the right side indicates this fact This patient was suffering from a gunshot wound of the brain which though mainly situated on the left side also extended across the mid line to the opposite cerebral hemisphere On this account in addition to the spastic paralysis of the right side the left leg and foot exhibited this condition This circumstance afforded an excellent control following the lumbar operation upon the right side In the course of a few weeks after the operation in the case of this patient the ankle clonus formerly present on both sides disappeared on the right side although it was still to be elicited on the left The clinical observation receives significance from Langelaan s conclusion (8 p 392) that a clonus is composed by a series of twitches superimposed upon a tonic shortening and that the beginning of clonus is always accompanied by such a tonic shortening He found this tonic shortening to be a tonic tetanus due to the exalted irritability of the proprioceptive reflex arc

Dr Royle has found that the diminution in the activity of the tendon reflexes is not always as marked as in this instance but that it does occur is undeniable This result is to be ascribed to an indirect effect upon the somatic spinal arcs When the rigidity is removed by sympathetic ramisection the excitability of the somatic reflex arc is diminished due to the reduction in the impulses passing into the spinal medulla through the afferent limb of the arc In the case of clonic action however absence of plastic tone would militate in addition against the maintenance of the shortened state of the muscle necessary for the exhibition of the series of twitches constituting the clonus

Another striking contrast in the first patient was to be seen in the behavior of the right and left foot to passive dorsiflexion Dr Royle records (loc cit p 82) that if the left foot were passively pushed into dorsiflexion there was a tendency for this position to be maintained and only slowly was the attitude replaced by plantarflexion On the right side however passive dorsiflexion of the foot was followed by immediate and complete relaxation Passive movement provides an excellent test for the presence of plastic tone because it indicates the presence or absence of lengthening and shortening reactions In performing passive movement it is noteworthy that Sherrington (49) has called attention to the fact that in decerebrate rigidity the resistance to passive flexion is at first considerable and then suddenly subsides This has its counterpart in the clasp-knife character of spasticity This phenomenon is due to the fact that resistance to the force in the first instance is offered by both contractile and plastic tone and the position can be altered only when the contractile tone is overcome

Riddoch (42) has pointed out that the shortening reaction of the knee extensor may be elicited by suddenly raising the spastic limb from the bed so that the leg is free If the shortening reaction is present the leg is for a time held in the position of extension against its own weight If now the leg be passively flexed the lengthening reaction will be elicited *If present the lengthening and shortening reactions constitute an indication for the operation of sympathetic ramisection in cases of spastic paralysis*

Following sympathetic ramisection in man and animals even inspection frequently reveals a change in the character of the tendon jerks The knee jerk for example is active and ample but the leg rapidly fall to its original position when the contraction phase of the jerk ceases (18) De Boer (14) has remarked upon the briskness of the knee jerk after the removal of the rami communicantes of the lumbar sympathetic chain The tendency to maintain the extended position assumed as a result of the jerk is not so great after removal of the sympathetic nerve supply to the extensor muscle of the knee Normally this tendency leads to the shortening reaction which maintains the extended position after cessation of the jerk contraction during the phase of relaxation The jerk element is subserved by a spinal reflex and is active in the spinal animal and spinal man Sherrington (50 p 211) says When the reflex excitability of postural contraction in the knee jerk muscle is low as it is in the first period after spinal transection the jerk is brisk ample and easily obtained and its graphic record is of very simple character The relaxation fall of the curve is full drops to the zero abscissa freely and is usually followed by some pendular oscillations subsiding more or less rapidly The oscillations are partly due to the inertia of the limb partly to that of the recording apparatus

In decerebrate rigidity when the reflex excitability of the postural contraction of the knee extensor is high on the other hand the curve of the knee jerk does not drop to the abscissa but exhibits the shortening reaction Successive taps may lead to step-like extension of the leg Now postural contraction on which the shortening reaction depends is made up of plastic and contractile components and the extensor muscle once the jerk contraction ceases requires somatic and sympathetic connection for its exhibition in order to retain the extended position of the knee Sympathetic ramisection therefore affects the shortening reaction only of the tendon jerk and not the jerk contraction itself The tendon reflex combines both the

contractile and plastic elements of tone when normally executed But as Langelaan (8) has pointed out it affords information especially about the contractile component of the tonus which is responsible for the jerk contraction When plastic tonus is enhanced in degree the reflex appears to be slowly performed due to the delay in complete relaxation of the shortened muscle It is this feature of the tendon reflex and not the degree of activity of the jerk contraction which is an indication in cases of spastic paralysis that benefit to the patient will follow sympathetic ramisection After the operation the tendon reflex appears to be brisk for plastic tone has been removed and the relaxation after the contraction has ceased is rapid and complete (Fig 7)

Langelaan (loc cit p 327) suggests the use in combination of the terms slow or brisk and normal diminished or exaggerated to describe the degree of plastic tone exhibited by the muscle and the degree of activity of the jerk contraction of the muscle respectively *Slowness in execution of the tendon reflexes is an important indication for the operation of sympathetic ramisection for the relief of spastic paralysis*

Conversely rapidly executed reflex movements usually constitute a contra indication for the operation The greater number of spinal injuries are accompanied by this type of reflex and plastic tone is at a minimum This is due to the fact that a prespinal reflex is essential in higher forms for the maintenance of this property of muscle and usually though not always as will be proved subsequently this reflex is rendered inactive when the spinal medulla is injured

THE PRESPINAL REFLEX ARC SUBSERVING PLASTIC TONE

Plastic tone is enhanced in degree in the decerebrate animal It may appear as a component of postural contraction immediately the mid brain is transected so that normally prespinal pathways are employed by the impulses maintaining it When decerebration is performed plastic tone is increased in degree due to the release of this prespinal sympathetic reflex arc from higher levels of control In addition to this contractile tone is enhanced in value because of the release of a somatic prespinal reflex arc In acute preparations this increase of contractile tone selects the antigravity muscles and their antagonists are reflexly inhibited The increase in plastic tone rigidly maintains the extended posture which is endowed by contractile tone upon all four limbs of the quadruped and maintains the condition of reflex standing for long periods of time When the relaxation from the posture of extension occurs plastic tone still remains as is proved by the presence of lengthening and shortening reactions

The prespinal reflex arcs subserve the two components of tone of the normal skeletal muscle and overactivity of these arcs accounts for the phenomena exhibited by the muscle in decerebrate rigidity It was shown by Sherrington (47) that sections through the medulla oblongata led to flaccid paralysis of the limbs More precisely as Magnus has shown the limits within which transection of the brain stem produces decerebrate rigidity are as follow the cranial limit is a plane passing dorsally at the level of the caudal limit of the superior colliculus and ventrally in the region immediately caudal to the mammillary bodies The decerebrate rigidity persists until the level of entrance of the eighth nerve is passed (cf Walshe 57) Obviously therefore the nuclei which constitute the cell stations of the prespinal reflexes responsible for decerebrate rigidity lie within these limits

The work of Thiele (53) which is supported by the recent findings of Bazett and Penfield (5) indicates that the integrity of the lateral vestibular nucleus of Deiters is essential for the development of decerebrate rigidity It may be concluded that this nucleus takes part in the completion of one of the reflex arcs the hyperactivity of which is responsible for decerebrate rigidity The vestibulospinal tract which lies in the region of the emerging motor root fibers of the spinal medulla mainly on the same side as the nucleus from which it originates constitutes the descending limb of the reflex arc (cf Lloyd 32)

The nucleus of Deiters is a special afferent somatic nucleus and the reflex arc in which it is incorporated constitutes therefore the

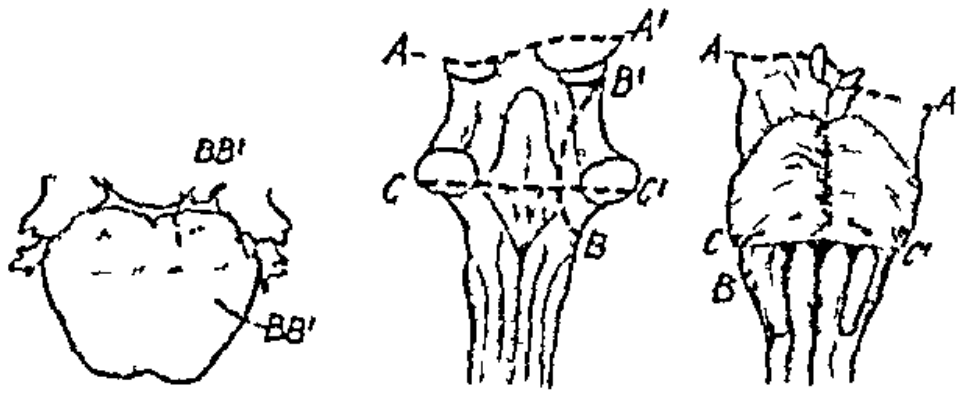


Fig. 8. Diagram to illustrate the various lines of section to produce decerebrate rigidity (A A') to remove the nucleus of Deiters (B B') and to produce flaccid paralysis (C C').

somatic proprioceptive reflex pathway. It subserves contractile tone which has a selective incidence upon antigravity muscles maintaining the body erect.

The question arises as to whether the nerve cells incorporated in the sympathetic preganglionic reflex arc can also be identified. The levels between which section of the brain stem produces decerebrate rigidity suggest that the *formatio reticularis of the pons applies the* cell station of this arc. The reticulospinal tracts of the pons are anatomically of special importance. Collier and Buzzard (1) have *termed them the pontospinal tracts. The* anterior pontospinal tract which is uncrossed descends in the lateral zone of the medulla oblongata and the anterior funiculus of the spinal medulla. The lateral pontospinal tract crosses to the opposite side and lies in the lateral zone of the medulla oblongata and in the lateral *funiculus of the spinal medulla.*

Sherrington's (4) experimental results are compatible with the view that the vestibulospinal and pontospinal tracts convey impulses to the spinal medulla which are responsible for decerebrate rigidity. Section of the lateral half of the bulb abolishes the rigidity on the same side as the lesion. Section of one ventrolateral column of the spinal medulla in the cervical region destroys the rigidity in fore and hind limb of the same side while section of one lateral column in the upper lumbar region abolishes the rigidity in the hind limb of the same side as the section. The ascending limbs of these arcs are also in the anterolateral funiculus for section of the posterior funiculus does not abolish decerebrate rigidity.

In an experiment to study this point I have found that plastic tone does not disappear after removal of the nucleus of Deiters. Fort decerebrate rigidity was produced by transection of the mid brain between the superior and inferior colliculi (Fig. 8, I). Extensor rigidity developed rapidly and well. Now in a *phase of relaxation when plastic tone* was well shown in the right hind limb, I isolated the region of the lateral angle of the fourth ventricle on the right side by a crescentic incision (Fig. 8, B B'). Microscopical examination proved that Deiters nucleus had been removed and the vestibulospinal tract severed by the procedure. But the lengthening and shortening reactions were still exhibited. A second transection (Fig. 8, C C') at the junction of the pons and medulla was then *performed.* The limbs became flaccid immediately. The lengthening and shortening reactions were no longer to be elicited. Obviously the plastic tone depends upon a reflex arc which attains a level between the mesencephalon cranially and the medulla oblongata caudally. This is compatible with the view that the pontospinal tracts subserve the function of plastic tone.

It is possible for an incomplete lesion of the spinal medulla to affect the pyramidal and concomitant descending tracts so releasing the primary spinal arc from control without affecting in any considerable measure the vestibulospinal and pontospinal tracts. Rid

doch and Buzzard (43) have recently described cases of quadriplegia from high cervical lesions of the spinal medulla in which the distinctive qualities of decerebrate rigidity were reproduced Riddoch (42) reports that postmortem examination of one of these patients revealed a tumor in the region of the posterior and lateral columns of the fourth and fifth cervical segments of the spinal medulla The ventral portion of the cord was relatively little affected

It is to be clearly borne in mind that the extensor posture is a relatively unimportant character in establishing an analogy between the condition of spastic paralysis in man and decerebrate rigidity experimentally produced The posture assumed is due to the selective incidence of contractile tone upon the skeletal musculature Riddoch and Buzzard (43) recorded that in their patients the position of flexion was sometimes encountered On these occasions the flexors were more spastic than the extensors This condition could sometimes be induced by holding the limbs in the flexed position for a short time Further McAlpine (36) reported a case in which rigidity was not confined to extensor muscles and flexor rigidity of the knee joint was sometimes obtained

Graham Brown (15) has demonstrated beyond all doubt that plastic flexor tone may be exhibited in the limbs of the monkey These observations are of added significance in the light of Bazett and Penfield's work (5) on chronic decerebrate rigidity These authors describe two kinds of decerebrate rigidity extensor and flexor Their observations prove that the somatic reflex arcs producing contractile tone may selectively act upon either the extensor or flexor muscles In extensor rigidity the reflex of which the vestibulospinal tract is the descending limb is involved In flexor decerebrate rigidity the primary spinal reflex is no doubt responsible for the activity for severe injury to the spinal medulla produces paraplegia in flexion (cf Walshe 59 p 31) In both types of decerebrate rigidity plastic tone which is enhanced in degree and co exists with contractile tone is maintained by the sympathetic prespinal reflex arc In each case it is inhibited in the antagonists of the muscles exhibiting the rigidity

Inhibition in the antagonists is not so complete in man as it is in the condition of acute decerebrate rigidity in animals Dr Royle has called attention to this point Riddoch (4) makes mention of the fact that though the antagonistic muscles are relatively relaxed they are certainly in stronger contraction than the corresponding muscles of a healthy individual

I believe that the explanation of this is that in the acute decerebrate preparation the extensor reflex arcs chiefly through the nucleus of Deiters immediately manifest increased activity The isolated flexor spinal arcs regain activity only after a period of inactivity When this occurs the selective action of contractile tone on the extensors is not so complete for the spinal arc endows this aspect of tone upon the flexors also Reflex inhibition is now not complete Bazett and Penfield's experiences with the chronic decerebrate animal support this view Moreover in patients suffering from spastic paralysis plastic tone is not inhibited in antagonistic muscle groups which accounts in some measure for resistance to active reflex or passive movement of the limb

I have commented on the work of Bazett and Penfield to emphasize the fact that the posture of the patient is not the all important criterion of rigidity Even the flexed position may be due to a combination of both contractile and plastic tone which together cause rigidity in the sense in which this term is employed in this paper Conversely the extensor position may be wholly due to contractile tone Sympathetic ramisection in such a case would be of no avail Extensor fits usually fall into this category This is beautifully illustrated in a case recently reported by Walshe (56) in which two stages of the illness were observed In the first stage the patient exhibited a condition of decerebrate rigidity The limbs were extremely plastic and tended to remain for a considerable time in any position passively imposed upon them The lower extremities were extended and adducted and the feet plantarflexed As is usual in man the upper extremities were semiflexed at the elbows with the forearms pronated and the wrists and digits flexed This attitude

often replaces that of extension of the fore limbs of quadrupeds because the upper extremities are no longer simple locomotor props (cf Walshe 61) Passive movement revealed the presence of the clasp knife character of the spasticity The tendon jerks exhibited tonic prolongation and in some instances in response to repeated taps step ladder shortening of the muscle was observed In recording these features Walshe established beyond doubt the identity of this condition with decerebrate rigidity experimentally produced

In the second phase of the illness the condition was replaced by the progressive failure of reflex activity and deepening coma In this stage tonic fits appeared as a concomitant of cardiac and respiratory irregularities In these fits the respiratory muscles were fixed and the limbs became so rigid in their customary posture that no tendon reflexes could be elicited In severe fits of this kind the head retracted forcibly At this stage none of the essential qualities of decerebrate rigidity enumerated as characterizing the first phase of the illness were exhibited For plastic tone was not apparently enhanced in degree The second phase was in all probability due to hyperexcitability of the somatic reflex pathways due to asphyxia or anemia (cf Walshe 6 and 63 Stewart and Lake 51 Warner and Olmsted 61 Hunter and Royle 23) The fits are not comparable to decerebrate rigidity in which the enhanced tone is due to release in function of two prespinal reflex arcs somatic and sympathetic Yet the posture displayed in each condition is the same Taking into account the results of tests for the presence of plastic tone in addition to posture Walshe (57) and Paddock (42) have been able to establish the essential identity of decerebrate rigidity and the condition of plastic paralysis such as that which occurs in hemiplegia quadriplegia and the extended form of spastic paraplegia

When the sympathetic gray rami distributed to skeletal muscle are stimulated the muscles supplied show no sign of shortening (Bayliss 4 p 545) But of course this is to be expected if the sympathetic innervation is responsible for plastic tone of skeletal muscle The result of appropriate stimulation would be to fix the muscle fibers governed by the sympathetic system at their existing length Obviously therefore athetoid movements or *intermittent spasms of muscle* which depend upon the process of shortening of muscle fibers are not dependent upon the sympathetic innervation of the muscle groups affected No appreciable improvement of these conditions follows sympathetic ramisection and their presence is in general a contraindication to the performance of the operation If during development with education marked improvement or loss of these features takes place any remaining rigidity which may be dependent upon the existence of plastic tone may then be examined with a view to subjecting the patient to operation to enable further progress in education to proceed

AFFERENT PATHWAYS MODIFYING THE PRESPINAL REFLEX ARCS SUBSERVING MUSCLE TONE

In the foregoing description the afferent impulses responsible for the maintenance of tone have been described as owing their origin to the muscles themselves Undoubtedly the proprioceptive reflex arcs alone are capable of *maintaining decerebrate rigidity* Other influences while not essential to the condition are capable of modifying it The work of Magnus and de Kleijn (35) has been responsible for the accurate identification of these pathways and for a complete explanation of their function

They have shown that two different sets of reflexes modify the tone of skeletal musculature As has long been known the labyrinth reinforces extensor tone of the body musculature But further in the decerebrate animal after bilateral section of the eighth nerve the tone of skeletal musculature may be modified by *rotation of the head* The extensor tone is inhibited on the side to which the vertex is turned This effect has been proved to be due to proprioceptive impulses from the muscles of the neck Therefore tonic labyrinthine and neck reflexes (standing reflexes) interact with the prespinal reflex arcs already described *and modify the tone of* skeletal musculature It is interesting to note that Walshe

demonstrated the presence of the tonic neck reflexes of Magnus and de Kleijn in the stage of decerebrate rigidity in the case to which reference has already been made

Langelaan (9) has shown that labyrinthine reflexes compensate for loss of the sympathetic innervation of the hind limb of the frog He proves that the effect is due to the dominance of the labyrinth of the opposite side to that on which ramisection is performed After a few weeks the effect of this dominance is to cause flexion of the hind limb on the operated side and extension of the intact limb

This increase of contractile tone in the flexors of the limb on the operated side obscures the loss of plastic tone following the operation Loss of plastic tone becomes evident only when the labyrinthine reflexes are exhausted or after the frog has remained suspended quietly for a period of 15 minutes This compensation following sympathetic ramisection is also evident in the wing of the fowl After a period of 2 months the droop of the wing is no longer evident until the impulses through the accessory pathways for the modification of contractile tone are cut off by keeping the bird at rest (1)

It is a noteworthy fact that decerebrate rigidity persists in the absence of the cerebellum (Sherrington 47) unless Deiters nucleus be injured in the process of removal (Thiele 53) Now Magnus and de Kleijn (35) have shown that tonic labyrinthine reflexes may be performed by the brain stem in the absence of the cerebellum Ingvar (25) points out that this does not exclude the possibility that in the intact animal the cerebellum is a higher controlling organ beneath which the reflex mechanism subserving body attitude is laid down in the brain stem In the light of the observations of Weed (65) who regards the cerebellum as an important if not essential part of the reflex mechanism responsible for decerebrate rigidity Sherrington (50) concludes that though the nervous mechanism for reflex standing does not require the cerebellum for its crude performance this structure commonly lends it a large amount of support and doubtless of refined adjustment and correlation too It will become apparent later that the cerebellum is the organ through which the cerebral cortex exerts its influence upon the reflex arcs subserving posture When the cerebral cortex is destroyed the influence of the cerebellum is automatically removed also

HIGHER LEVELS OF ACTIVITY CONTROLLING THE PRESPINAL REFEX ARCS RESPONSIBLE FOR MUSCLE TONE

1 Mid brain Magnus (34) has shown that in animals such as the rabbit cat dog and monkey the whole of the cerebral hemispheres including the corpora striata may be removed and the tone of skeletal muscle remain of normal intensity Nor is the tone altered when the brain stem is transected caudal to the thalamus Such a mid brain animal unlike the decerebrate preparation is capable of a great variety of reflex activities as walking running and jumping It can right itself if overturned the head at once resuming its normal posture These are the postural reflexes of Magnus (cf Walshe 54) Obviously therefore in these animals the mid brain provides an important part of the nervous mechanism utilized in the regulation of posture It is when this region is taken away that release of the prespinal reflex arcs takes place to produce decerebrate rigidity For instance in higher forms at least as Magnus's observations upon the monkey reveal the connections of the visual pathway with the mid brain play an important part in the nervous regulation of posture Tectobulbar connections therefore control the prespinal reflex arcs in these forms Moreover decerebrate rigidity develops after the removal of the red nuclei and as Walshe (57) mentions It seems as though removal of the greater part of the red nucleus is an essential preliminary to the development of rigidity In this process rubroreticular fibers which in man have attained special importance are severed The cell of the substantia nigra are also known to send axones to the tegmental region of the brain stem

Corpus striatum In view of prevailing conceptions it is noteworthy that in the animals described by Magnus the postural reactions are carried out by the mid brain in the absence of the corpus striatum It would

however be unwise to argue that in man the mid brain structures exhibit this independence of the corpus striatum for the principle of the shifting forward of function in the nervous system must not be lost to sight in this connection Moreover as Walshe (54) points out it may well be that the physiological value of the corpus striatum is only adequately expressed in the presence of voluntary activity In such a case the symptomatology of lesions of the corpus striatum with the cerebral cortex intact will be different from the experimental results of complete removal of both the cerebral cortex and corpus striatum

For these reasons the observations of Magnus that thalamus and mid brain animals exhibit tone of normal intensity and distribution cannot unreservedly be applied to man It is possible that the corpus striatum in man with the cortex intact controls through the intermediation of subpallidal nuclei as the substantia nigra the sympathetic prespinal arc subserving plastic tone To study this point I have removed the corpus striatum on one side in birds (1) employing the domestic fowl and the sea gull for this purpose Birds represent a widely divergent group from mammals In birds the corpus striatum has attained a relatively enormous importance both structurally and functionally The operation is easily performed on birds because the corpus striatum constitutes except for the septum and a small superficial area of cortex the entire cerebral hemisphere Further in removing the corpus striatum which is readily accessible because it forms the greater part of the surface of the hemisphere the cerebral cortex may be lifted up and left in communication with the septum In this way the tractus cortico septo mesencephalicus is *left intact*

This operation produces rigidity of all the limbs Standing is not evenly maintained due *to rigidity of the hind limbs* On this account in sea gulls a tendency to rise on the toes is constantly exhibited and the bird does not maintain any given position for long Birds in this condition often squat down presumably to avoid balancing on the rigid limbs The wings are also rigid and here the nature of the rigidity may readily be studied The *wings are sometimes maintained* in a position somewhat higher than usual so that the adjacent borders are almost in contact with one *another The rigidity maintains its intensity* during passive movement and on account of its rigidity the wing remains fixed in the new position assumed This occurs even though the position be so abnormal as when the wing is folded over the mid line of the back that the fibrous structures contained within are put upon the stretch Dependent positions are maintained equally well Both wings exhibit this phenomenon after the unilateral operation but the rigidity is greater on the ipsilateral side The rigidity is responsible for slowness of movement especially on the ipsilateral side This is readily seen on watching the movements of the wing during attempted flight while the bird is held captive in the hand A greater effort is necessary to carry the wing through a smaller range of upward movement than on the less affected side increased effort marks downward movement also and the wing seems to overshoot the position at which it normally ends These alterations in the nature of the movement of the wings are greater on the ipsilateral side so that the flight of such a bird when released is always in a circle the bird tending to fly toward the more affected side

This diffuse muscular rigidity is strongly reminiscent in an exaggerated *form of the* condition of the wing already described in which after the removal of contractile tone plastic tone is accessible for independent study I cannot avoid the deduction that increased plastic tone in both flexor and extensor muscles of the wing is responsible for the diffuse muscular rigidity which follows the removal of the corpus striatum in bird This *element of tone is so enormously* increased that manifestations of the presence of the contractile component are in the background

The condition of rigidity of the wing of birds above described is remarkably similar to Parkinsonian rigidity in man Its diffuseness resistance to stretching and the tendency for fixation of the muscle at any length passively imposed upon it are common to the two conditions and in both conditions pos-

erty and slowness of voluntary movement which are probably due in part to the underlying phenomenon of rigidity (cf Walshe 55 p 102) are notable concomitants

Removal of the influence of the sympathetic innervation by section of the cervical sympathetic trunk caudal to the brachial plexus abolishes the rigidity of the wing This property like normal plastic tone is subserved therefore by the sympathetic system It is difficult to escape the conclusion that the basis of the rigidity following lesions of the corpus striatum is increased plastic tone which is exhibited in all muscle groups and that this is due to removal of control from the sympathetic prespinal reflex arc which maintains the plastic tone of normal skeletal muscle

Elsewhere (18 19) I have called attention to the fact that morphology lends support to the view that the corpus striatum is a higher sympathetic level of activity Ariens Kappers (3) says Visceral disturbances also may occur (liver, bladder) in disease of the corpus striatum and that sympathetic functions have been found to exist here is not so strange in connection with the fact that the primitive striatum develops near the frontal end of the sulcus limitans which according to several authors (cf Herrick) ends in the preoptic recess Moreover we know from the researches of Boeke Dusser de Barenne Agduhr and de Boer that also in muscle tonus sympathetic fibers may act a part

The different manifestations of excess of plastic tone in those cases of spastic paralysis which resemble experimental decerebrate rigidity and in the condition of Parkinsonian rigidity are capable of reconciliation The fundamental difference between the two conditions is that while plastic tone is increased in both contractile tone is also exhibited in excess in spastic paralysis while it is not greatly in evidence in Parkinsonian rigidity Contractile tone is selective in its incidence and the plastic tone of the antagonists of the muscles selected by it is to a very varying degree reciprocally inhibited In Parkinsonian rigidity this selective incidence upon muscles and consequently the selective inhibition of plastic tone in the antagonists are absent In spastic paralysis resistance to passive movement is considerable till the position imposed upon the limb by contractile tone is overcome when the resistance becomes less A combination of contractile and plastic tone is responsible for the initial position in spastic paralysis The posture assumed in Parkinsonian rigidity is due to plastic tone only exhibited in agonists and antagonists and therefore resistance to passive movement is the same throughout the whole range of movement The fact that postural reactions and intercurrent reflex movements are not exhibited in Parkinsonian rigidity as in spastic paralysis is a further indication that somatic activities which include contractile tone are in abeyance in this condition The mechanism which inhibits plastic tone in order that a movement may be performed or to allow a new posture to be assumed is no longer active This effect is probably the cause and not the result of the rigidity That is to say a predominant function of the corpus striatum is to regulate plastic tone From a consideration of the other effects of corpus striatum lesions it seems that this regulation is especially in the interests of automatic and associated movements and of emotional expression These functions are no doubt impaired by the lesion the rigidity itself may limit these activities still further

It remains to be proved that the rigidity of paralysis agitans and allied conditions is subserved by a proprioceptive mechanism in order to establish completely the identity of the tendency in this condition to fixation of the muscle at any length imposed upon it with the lengthening and shortening reactions

In the first place it must be borne in mind that the sympathetic reflex arc subserving plastic tone is not necessarily at the same level as the somatic connections Therefore in posterior root section contractile tone may be affected without removing plastic tone (Fig 1) In Sherrington s deafferented specimens all the posterior nerve roots connected with the limbs were resected In his experiments on the fore limb (47 p 323) of the cat he removed the posterior nerve roots of the lower cervical nerves and the first thoracic nerve In the case of the hind limb (49 p 125)

he removed usually the fourth and fifth lumbar nerves Now Langley (30 p 637) has found that the white rami of the *sympathetic* system in the cat extend from the first thoracic *to the fourth* lumbar segments Therefore in both operations Sherrington removed any afferent sympathetic fibers entering the spinal *medulla at the level of the highest and lowest* white rami respectively

Surgical operations upon the posterior nerve roots have necessarily been less complete than is possible under experimental conditions

Fenichel's cases (quoted by Walshe 55) in which posterior root section was performed for the relief of paralysis agitans are evidence of this In one case the fifth sixth and eighth cervical posterior nerve roots were divided In this case the rigidity was undiminished Obviously however the sympathetic afferent connections of the skeletal muscle of the limb were left intact by this operation because the first thoracic posterior nerve root was not attacked Therefore this case does not disprove that rigidity is maintained by a proprioceptive mechanism The first principle of posterior root section in man should be to include the first thoracic posterior nerve root in the case of the upper limbs and first or second lumbar posterior nerve roots in the operation for the lower extremities

However Walshe (loc cit) has recently brought forward strong evidence that the rigidity of paralysis agitans is due to the activity of a proprioceptive reflex mechanism He has shown that injection of 1 per cent novocain into the muscle at its motor point causes rigidity to disappear While admitting the possibility that this effect may be due to direct action upon the muscle he shows convincingly that the balance of evidence is in favor of the view that the afferent nerve terminations are affected

Walshe's investigations upon the rigidity of paralysis agitans beautifully illustrate the fact that the tremor exhibited in this condition and the rigidity are subserved by two different nervous mechanisms For although novocain abolishes rigidity the tremor is totally unaffected The indications are that impulses through the cerebrospinal tracts are involved in the production of spontaneous tremor for it disappears after hemiplegia (5, 67)

This is in accord with the results of sympathetic ramisection in this condition The rigidity is markedly diminished voluntary power is increased and movements are more ample and rapid but the tremor is not appreciably affected when well established But a patient with Parkinsonian rigidity without tremor as for instance as a sequela of encephalitis lethargica may derive sufficient benefit to justify the operation

In a recent paper McAlpine (36) has described a patient who as sequela of epidemic encephalitis developed Parkinsonian rigidity on the right side and a condition strongly resembling decerebrate rigidity on the left side According to views advanced here the diffuse muscular rigidity on one side was due to a generalized increase of plastic tone lack of selective incidence being due to the absence of increase of contractile tone. The rigidity on the other side however was sometimes flexor and sometimes extensor Therefore contractile tone was present and acted selectively on different groups of muscle at different times Plastic tone was also enhanced in the upper and lower limb of this side It was exhibited by the presence of the lengthening and shortening reactions It was shown to the greater extent in the flexor and extensor muscles at any particular time according to the selective incidence of the contractile tone at the time In the erect posture tone predominated in the extensor muscles of these limbs Since the tone responsible for this decerebrate attitude consist of the two normal components of tone the term plastic tone alone is clearly inadequate to describe the condition Sherrington's term postural tone may be used for this purpose Contractile tone reflexly imposes the position upon the body and plastic tone maintains this position once it is assumed On passive movement the characteristic lengthening and shortening reactions indicating the presence of plastic tone are elicited

3 *Cerebral cortex* In a natural attitude such as standing contractile tone is responsible for selective action upon anti-gravity muscles

and plastic tone fixes the length of the muscle fibers necessary to maintain this position To accomplish voluntary movement from this position the prespinal reflex arcs responsible for postural tone must be controlled by the cerebral cortex Evidence is accumulating that the cerebral cortex not only causes contraction of the appropriate muscle groups by way of the cerebrospinal tracts but inhibits the reflexes responsible for postural contraction It effects this purpose through the intermediation of the cerebellum

Sherrington (47) and Loewenthal and Horsley (33) suggested the presence of such a cerebellar pathway These observers located the inhibitory area of the cerebellum in the anterior part of the superior vermis Weed (63) confirmed this observation and elucidated facts which pointed to the presence of an inhibitory pathway from the cerebral cortex to cerebellum He found that in the decerebrate cat stimulation of the medial one fifth or one sixth of the cerebral peduncles at the level of transection of the mid brain led to the entire disappearance of the rigidity of the ipsilateral limbs and diminution in the contralateral This did not occur after removal of the cerebellum Further experiments showed that the path from the peduncle ascended to the cerebellum by way of the contralateral middle cerebral peduncle

Warner and Olmsted (64) have traced the origin of this inhibitory tract to the frontal region of the cerebral cortex When the motor area was cut away no increase of extensor tone was observed on either side of the body Definite rigidity developed at once in the contralateral fore and hind limbs when the frontal area was removed This observation is of great significance in view of the fact that in man pure cortical lesions of the pyramidal tracts do not produce spasticity On the other hand lesions of the area of the frontal lobe from which the frontopontine tracts originate (Campbell) are associated with a condition of tonic innervation expressed as inability to relax a contracted muscle group (cf Wilson and Walshe 67)

Warner and Olmsted have elucidated the course of this tract arising in the frontal region by studying the inhibition of rigidity obtained by electrical stimulation of the cut surface of the brain in various situations They found that the inhibitory effect of the tract is bilateral but predominantly contralateral The tract passes from the frontal lobe through the medial part of the internal capsule Caudal to the level of the superior colliculi it crosses in greater part at least to the other side of the brain stem It continues to the cerebellum by way of the middle cerebellar peduncle The inhibitory tract is therefore frontopontocerebellar in its connections

Warner and Olmsted state that when this tract is stimulated a limb exhibiting extensor rigidity goes limp and flaccid Miller and Banting (37) describe the effect of stimulation of the anterior surface of the vermis as being immediate and general relaxation of the rigidity Obviously the inhibition affects both contractile and plastic components of tone which are enhanced in degree to produce decerebrate rigidity The frontopontocerebellar tract therefore inhibits the effect produced by the somatic vestibulospinal and sympathetic pontospinal tracts When this tract is ineffective the power to relax the muscles after being employed in muscular effort is defective In the absence of a case purely of this nature in Dr Royle's series it is interesting to note that the effect of sympathetic ramisection improves the power of relaxation of contracted muscles in spastic paralysis It is to this fact that the increased control and rapidity of effecting voluntary movement are due The patient need no longer inhibit plastic tone His cortical control is mainly concentrated on executing movement

It is worthy of note that tumors of the middle lobe of the cerebellum give rise to fits of a tonic character in which the extensor attitude of decerebrate rigidity is assumed (cf Hughlings Jackson 17) Sherrington (47) found that a rigidity somewhat similar to that ensuing on removal of the cerebral hemisphere set in after median section or ablation of the cerebellum He was not convinced that the two conditions were identical Thiele (53 p 369) however regarded the bilateral rigidity which followed removal or bisection of the vermis as being like decerebrate rigidity He

explained it as being due to loss of the inhibitory control of the vermis over the nucleus of Deiters No doubt also the pontospinal tracts are released from control It will readily be seen that the only effect of sympathetic ramisection upon tonic extensor fits following interference with the frontopontocerebellar pathway is to diminish the degree of rigidity during the extensor spasms Since contractile tone remains practically unaffected after this operation the extensor attitude will still be assumed This is another instance of posture alone not being an indication for ramisection

The fact that the cerebral cortex employs the cerebellum as an intermediate organ through which it exerts an inhibitory influence over the postural reflex arcs of the brain stem is of great general significance It confirms the suggestion of Walshe (60) that the cerebellum is the organ through which the cerebral motor cortex influences postural activities and regulates posture in the interests of coordinated purposive movement It may be here proceeds the subordinate mechanism employed by the cerebral cortex in the refined correlation of posture and movement This view indicates that the cerebellum is employed by the cortex in the performance of active movements also It reinforces postural tone in order to maintain the attitude of the body assumed during the performance of the movement initiated and executed by motor impulses which have their origin in the cerebral cortex

In 1900 discussing the significance of the cerebrocerebellar pathway which passes through the brachium pontis Sherrington (48) said Thus one and the same cerebral discharge may perhaps pour upon the motor root nerve cells a combination of cerebral and cerebellar impulses It is on account of the influence of the cerebral cortex in the regulation of posture through the intermediation of the cerebellum that lesions of the cerebellar hemisphere cause incoordination of voluntary movements

When a voluntary movement is completed cortical impulses reinforce contractile tone to determine the attitude assumed by the body Plastic tone aids in maintaining the position because the muscle fibers exhibiting it are fixed at their new length After sympathetic ramisection this accessory contribution is lost but the influence of the cerebral cortex on contractile tone remains In this connection it is well known that tone is increased by attention (cf Langelaan 28 p 34) Also Dr Royle has noticed that during the first period of re-education after sympathetic ramisection when the patient's attention is focused on the performance of a voluntary movement under orders the cortex greatly increases the amount of contractile tone exhibited in the limb This increases the difficulty of the patient in performing the movement On this account gently executed movements are far more effective than considerable effort in this stage of the re-education process

Evidence is not wanting that plastic tone is of use also during the performance of voluntary movement Under ordinary circumstances a patient who has been subjected to the operation of sympathetic ramisection cannot detect any disability in consequence of the loss of the sympathetic nerve supply of his voluntary muscles However to test this matter closely (21) I have observed the effect of sympathetic denervation after the exercise involved in the flight of a bird During the flight of a sea gull in which the unilateral operation has been performed no obvious difference is to be detected in the movement of the two wings After completing a flight of one hundred meters however the position of the wing on the operated side is in marked contrast to that on the normal side It is drooped and abducted to a remarkable degree although hardly any deviation from the normal position may have been visible prior to undertaking the flight The explanation of this observation seems to be that plastic tone enables the living muscle fibers to follow up the contraction of the active fibers and assist in maintaining the intermediate positions assumed at all stages of the movement When plastic tone is removed voluntary effort is increased in order to maintain these intermediate position against the action of gravity as well as to perform the movement

It appears therefore that in voluntary movement postural tone made up of a contractile and a plastic component is first in

hibited the movement muscle fibers then contract and are assisted in maintaining the advantage gained by the plastic tone of neighboring fixing fibers which are passively shortened and finally cortical impulses determine that contractile tone is exhibited in the muscles whose contraction is necessary to confer the required position upon the body the length of the muscle when this position is attained is maintained by plastic tone exhibited by fixing muscle fibres

In certain cases of spastic paralysis plastic tone is in excess This interferes with voluntary activity because it is imperfectly inhibited at the outset of voluntary effort When excessive voluntary effort initiates movement the exaggerated degree of plastic tone which is present in both agonists and antagonists as Dr Royle has shown tends to provide resistance to the execution of the movement by fixing to an abnormal degree the length of the muscles of the limb at all the intermediate positions through which the moving part passes In this way the effects of diminished voluntary power are enhanced in degree on account of excess of plastic tone which is no longer adequately controlled by the cerebral cortex In fact this defective control is not infrequently the greater disability and on account of it the voluntary motor pathway may be unable to function to the full extent of which it is capable This disideratum is attained by removing the plastic tone entirely when the rigidity of the muscles disappears The result is that the initiation and the execution of voluntary movement are both improved

Dr Royle found that one patient with a gunshot wound of the cerebral cortex who illustrated the presence of excess of plastic tone to a striking degree before the operation was able to inhibit the tone of the extensor muscles of the knee following ramisection He was unable to flex the knee voluntarily but he could inhibit the tone of the muscles sufficiently to let the leg fall into the flexed position This was impossible prior to the operation In other words this patient was unable to inhibit plastic tone After ramisection he was able to inhibit the contractile component of tone which alone remained This patient illustrates that the cerebral cortex normally inhibits both components of postural tone and that injury may affect the control over the plastic component to a greater extent than that of the contractile element This accounts for the marked improvement in control which follows sympathetic ramisection

CONCLUSIONS

In conclusion therefore I wish to emphasize that the basic principle of the operation of sympathetic ramisection is that it removes plastic tone It is only indicated when plastic tone is in excess and hampers the voluntary activities which have persisted in spite of the central lesion A study of the nature of the spasticity of the spastic limbs and an estimate of the anatomical defect of the central mechanism responsible for the condition must go hand in hand and only when the physiological indications are discoverable is the operation to be undertaken

This principle stamped the teaching of the great surgeon who is honored in this annual memorial address With the wide grasp of knowledge which enabled him to encompass almost every specialized branch of surgery Dr John B Murphy made pioneer contributions to the surgery of the nervous system and his teaching in this domain is founded upon the basic physiological knowledge of his day True insight and a fine faith led him to say (38) as early as 1907

We feel that the nervous system offers sufficient inducement for surgical intervention to demand the surgeon s most careful systematic and analytic efforts both experimental and clinical The purpose of this address is to combine morphological experimental and clinical facts to demonstrate the physiological principles which should underlie the surgical procedure of sympathetic ramisection

NOTE—The [illegible] of the [illegible] permeate [illegible] referred [illegible] this paper has been defrayed from the [illegible] endowed [illegible] the University of Sydney by Mr George H Bosch Sydney

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THE ACUTE ABDOMEN[1]

By JOHN B DEAVER M D F A C S Philadelphia

THE subject of acute abdominal conditions comprises perhaps the most important questions in surgery and medicine The acute abdomen calls for careful judgment and thoughtful consideration It is not as a rule the result of virgin pathology In the majority of instances it is an end result of a chronic pathological process which has probably given evidence of its presence for a more or less prolonged period More often than not the cases present a history of an antecedent lesion such as chronic appendicitis peptic ulcer cholecystitis pancreatitis or hernia Occasionally the acute abdomen however results from conditions not easily recognized even by the most astute and experienced diagnostician Among such conditions may be mentioned mesenteric thrombosis acute obstruction due to internal strangulation by an unusual formation such as a diverticulum obstruction in an intestinal fossa obstruction due to hernia through a congenitally large foramen of Winslow We have recently experienced this last named condition at the Lankenau Clinic in Philadelphia The patient was brought to the hospital with all the signs of an acute abdomen operation was resorted to at once and the patient made a complete recovery

Acute intestinal obstruction also may be due to a congenital hole in the mesentery This rare condition has occurred in my experience It also presented the signs and indications that warrant immediate operation

The more common causes of the acute abdomen should be recognized without difficulty provided a careful study of the history and a well-conducted physical examination is made that is as thorough as circumstances permit

Permit me to call attention as I have frequently done on other occasions to acute intestinal obstruction in a patient who has had an abdominal operation at a more or less remote period The presence of an abdominal scar in a patient suddenly seized with acute abdominal pain should at once arouse suspicion of serious trouble and intestinal obstruction should be in the mind of the doctor Very often however the doctor fails to think of this because the textbook description of intestinal obstruction is in his mind such as vomiting of stercoraceous material distended belly inability to pass gas etc waiting for these signs makes it too late for a curative operation

The acute abdomen in the absence of an abdominal scar should first last and always suggest the appendix At the same time one must ever bear in mind the possibility of incipient pneumonia especially when the patient is a young child or in rare instances a diaphragmatic pleurisy In the presence of acute upper abdominal pain together with muscular rigidity rapid respiration rapid pulse high temperature and unusually high leucocytosis pneumonia should be considered in the diagnosis all the more so if in addition to the above the patient has had a chill

In the majority of cases the acute abdomen is due either to appendicitis or in the following order of frequency to cholecystitis perforated duodenal or perforated gastric ulcer acute salpingitis acute intestinal obstruction ruptured extra uterine pregnancy acute pancreatitis acute hæmatogenous infection of the kidney twisting of the pedicle of an ovarian cyst acute diverticulitis mesenteric thrombosis acute salpingitis etc

The acute appendix owing to the different positions it may occupy can easily simulate other conditions especially when it is retrocæcal or retrocolic (which is the case in 60 per cent of cases) and extend as high as the gall bladder thus presenting many of the signs and symptoms of acute cholecystitis The distinction between the two latter cannot always be made clinically When the acute appendix occupies its second most common position in the pelvis we all know how it resembles acute pelvic disease and in this position the pain is more likely to be referred to

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the left side of the abdomen other positions of the appendix are subcæcal anterior to the terminal ileum or pre ileal posterior to the terminal ileum or post ileal pointing to the left in the direction of the spleen

On general principles it may be said that in the acute abdomen with diffuse peritonitis in the absence of a history that would enable a reasonably sure diagnosis and in the absence of a localized point which would be a guide for the surgical point of attack it is the part of good judgment to defer operation and to place the patient under strict anatomical and physiological rest or as we term it in the Lankenau Hospital regulation In many instances in the presence of a diffuse peritonitis or what I take to be such I have been able to make the diagnosis a few hours after the patient has been on such regulation treatment This means relieving pain by judicious doses of morphia given hypodermically commencing with the smallest dose consistent with the severity of the pain and increasing the dose when necessary washing out the stomach and repeating the washing if necessary and applying the Murphy drip and an ice bag to the abdomen I have misgivings in some of these cases as to the diagnosis of diffuse peritonitis and when I have seen them improve have wondered whether the condition was not a diffuse peritoneal irritation but even so the recovery of the patient is the answer to the question To open the abdomen of a very sick patient when one has practically no idea of what is wrong is to my way of thinking and from my experience to say the least unwise

If the treatment of the acute abdomen is to succeed the diagnosis must be made early It is the peritonitis that so often clouds the picture and when advanced often makes diagnosis impossible The first one on the scene assumes the greater responsibility that is in the early case It behooves us therefore to be ever on the alert

The acute abdomen still occupies too prominent a place in mortality statistics There are various explanations for the unnecessarily high figures It is with chagrin that we must admit that among the main reasons for this are untimely and unsuitable operations

What would I have you understand by untimely operations? I can perhaps best make this clear by mentioning operation for appendicitis in the presence of a diffuse peritonitis a silent belly and no palpatory evidence of a point of localization This was wonderfully well expressed by the late Dr Maurice Richardson as too early for a late operation and too late for an early operation ' This would apply also to acute cholecystitis with diffuse peritonitis To operate in the presence of acute hæmorrhage from the stomach without very strong evidence that it is due to chronic ulcer is also untimely

What would I have you understand by unsuitable operation? An operation for acute appendicitis with circumscribed peritonitis and abscess formation in which the opening is made into the free peritoneal cavity is an unsuitable one if the best interests of the patient are to be served In appendiceal abscess where the mass is in the neighborhood of or to the outer side of or behind the cæcum or the descending colon or in the pelvis the two most common positions for the appendix it is my practice in the case of the former to incise the abdominal wall well to the outer side of the mass cutting down on the transversalis fascia through which I work in exposing the peritoneum when if I am able to feel a soft point indicative of the presence of pus I open the peritoneum well down and under the mass as it were When the peritoneum is thus exposed by hiding the fingers beneath the mass one can frequently lift it up thus making it very clear where to attack the abscess with the least risk We are all familiar with the œdematous tissue so commonly present in these advanced abscess cases

In appendiceal pelvic abscess the same route of approach is followed with the exception that the incision does not extend so high and is carried down lower When the abscess in either situation is evacuated and carefully sponged so as to present a clear field the appendix may be removed if it is deemed advisable I may say here it is not my practice to take out the appendix in all these abscess cases But if I do not take it out at the time of treating the abscess I certainly

advise its removal when the patient has recovered from the operation

An operation for perforated peptic ulcer where merely closing the ulcer would not be a perfectly safe provision against leakage is likewise an unsuitable operation unless a gastro-enterostomy is also made Let me add that in perforated ulcer of the duodenum favorably situated for resection but where the opening cannot be made water tight by closure with suture and omental reinforcement resection should be done provided of course that the case is an early one I have seen leakage take place 4 or 5 days after operation in such cases followed by death I am glad to say that I have not had this occur in my own practice but nevertheless it is one of the possibilities the surgeon I care not who he may be must face An operation for acute intestinal obstruction superimposed upon a chronic obstruction due to a neoplasm which would include excision of the growth is also an unsuitable operation

On the other hand the high mortality of the acute abdomen is partially due to the lack of intimate knowledge of living surgical pathology and partly because of too great a reliance on laboratory findings which do not always correspond to the operative findings and finally also to hesitancy in adopting radical measures in the hope that the patient may recover under what is called conservative treatment Radical treatment under these conditions however is truly conservative because it conserves life A case in point to illustrate my contention that too much reliance is placed on laboratory findings is when the attending physician has made a diagnosis of appendicitis and postpones operation until he has made a blood count There is of course no objection to this provided the loss of time in getting the count does not add to the danger of the situation But this is not likely When however the count having been made shows no high leucocytosis and the doctor allows this to influence him against operation he assumes a terrific responsibility The result of this attitude is that many cases of appendicitis are brought to operation when the pathology is so extensive that not only does recovery become questionable but operative sequelæ of an unpleasant kind may be expected The late Dr John B Murphy said that for every death from appendicitis somebody has been to blame I have frequently been called on the telephone to hold myself in readiness to operate if the blood count not yet taken should be high This order or I should say disorder of affairs has cost many a life I venture to say without incurring the risk of too much assurance that no one is in a much better position than myself to realize this as a fact When to operate in acute appendicitis depends as I have so often stated not upon the blood count but upon the physical examination and the condition of the patient

Let me digress for a moment to say that frequently when I am called in to see a case of acute appendicitis practically recovered from the attack and I advise removal of the appendix when recovery is complete the doctor in attendance advises waiting for another attack before having the patient subjected to operation This I believe is almost criminal for I have seen many patients perish in the subsequent attack Who has been to blame? Unfortunately the medical man and not the surgeon is too often the consultant in acute appendicitis this is as unfortunate perhaps as having the surgeon and not the medical man the consultant in a case of typhoid or scarlet fever The late Dr Osler said that in acute appendicitis the surgeon can be called too late but never too early

Among the untoward events following delayed operation—an event which does not happen after early operation—is a fæcal fistula One of my senior house surgeons (Dr Maurice P Charnock) in the Lankenau Clinic has just completed for me the records in the last two hundred fæcal fistulæ occurring among 4 063 late cases of acute appendicitis showing that 1 in every 0 case is exposed to this sequel to say nothing of the occurrence of other sequelæ

Acute diverticulitis of the sigmoid very closely resembles acute pelvic appendicitis so much so as to make the differential diagnosis at times almost if not altogether impossible Acute abdominal pain and the presence of a mass in the left lower abdomen should suggest

the diagnosis of diverticulitis (diverticular inflammation) The history of the diverticular conditions differs from that of appendicitis in that the patient is more likely to complain of constipation much intestinal flatus and more or less discomfort in passing gas as well as soreness referred to the lower left abdomen Rectal examination in both cases is important and in diverticulitis is more likely to demonstrate a mass than in appendicitis although in the majority of cases of diverticulitis the diverticulum with the surrounding inflammatory exudate is situated too high up to be felt per rectum Here also the diagnosis may be clouded by the presence of a peritonitis Occasionally in diverticulitis there will be rectal tenesmus which may also be present in acute pelvic appendiceal abscess but this does not occur often enough to make it of much moment in the differential diagnosis

Acute perforating peptic ulcer which occurs in from 15 to 20 per cent of ulcer patients is another common cause of the acute abdomen This is more frequent with the chronic duodenal than with the chronic gastric ulcer while perforation of a marginal ulcer though rare may also take place Perforation also occurs in the acute round ulcer All of them however present practically the same symptoms and signs so that the exact diagnosis of the type of ulcer is of little moment until the abdomen is opened The surgeon not familiar with the operative technique for the non perforated marginal ulcer may find difficulty both in locating and in correcting the same If a patient with a history of having had a gastro enterostomy becomes the subject of an acute abdomen perforation of a marginal ulcer should be thought of for unfortunately marginal ulcer still remains the most serious sequel of a gastro enterostomy

The acute abdomen due to an acute perforated peptic ulcer should always be recognized by anyone who has once seen this condition It is marked by *sudden onset* of terribly acute abdominal pain which is immediately followed by pronounced boardlike rigidity of the abdominal muscles (once felt never forgotten) and the inclination of the patient to remain immovable on his back with the legs drawn up in other words the patient does not attempt to change his position fearing his pain will be made worse I as well as my house surgeons have made this diagnosis many times by simply palpating the abdominal walls I often wonder if this diagnosis is not missed because the doctor who first sees the patient did not palpate the belly The history in these cases plays a small part because the patient is so obsessed with the idea of obtaining relief that he forgets the past in fact does not even want to be asked about it The history is best obtained during recovery after the operation The frequent occurrence of acute perforation of a peptic ulcer should keep any right minded doctor from advising medical treatment for chronic non perforating peptic ulcer and convince him of its uselessness from the standpoint of cure I am very positive in the stand I am taking on this subject because of the many catastrophies I am constantly being confronted with Chronic peptic ulcer like appendicitis I think is the surgeon's province The doctor who is on his job and sees the case early can add much to his own joys and that of the surgeon but if he is not on his job trial and tribulation await him as well as the surgeon

It certainly is an indisputable fact that a knowledge of living surgical pathology better enables us to recognize and interpret signs which otherwise might be inconclusive and hazy To illustrate this point let me take a case of carcinoma which is not definitely diagnosed before operation A working knowledge of surgical pathology helps very materially in deciding the very important question as to what to do To start to remove a growth about the nature of which one is not reasonably clear would too often mean that the operation once begun must be completed otherwise the patient will perish if not immediately then later from loss of blood A working knowledge of the living pathology will tell whether or not to attempt removal

I recently operated upon one of my colleagues who was intensely jaundiced with the severe itching that frequently goes with jaundice He was emaciated careworn in appearance with no desire for food The preoperative diagnosis was carcinoma of the pancreas On opening the abdomen I saw a hugely

distended gall bladder and felt a mass in the head of the pancreas and the entire pancreas was moderately hard so I quickly made a cholecystoduodenostomy and nothing more Some of the medical friends of the doctor who were present took exception to my method because I did not make a more careful and prolonged examination also because I did not take a specimen for examination The operative diagnosis wavered between chronic pancreatitis and carcinoma in favor of the former since the entire pancreas was moderately but not stony hard with a mass in the head of the organ The patient 6 months later is greatly improved is gaining strength and weight and is entirely relieved of jaundice My decision was quickly made from what I had learned in my many studies of living pathology

Acute pancreatitis should be thought of in the presence of sudden violent abdominal pain referable to the epigastrium or the adjacent portion of the abdomen followed by syncope or shock persistent vomiting of small amounts of bilious material subnormal temperature and a rapid weak pulse cyanosis of the face and extremities swelling of the epigastrium which is tender especially to deep pressure If acute pancreatitis cannot be ruled out in the differential diagnosis operation should immediately be done when if this condition is found the surgeon should deal only with the pancreatic lesion and not attempt to investigate the *biliary passages* This in my experience promises most for the patient I am aware that in the past these cases have been more often diagnosed as acute intestinal obstruction than acute pancreatitis I can understand this error in the presence of an acute obstruction by a volvulus or an internal hernia but not in the ordinary forms of obstruction While speaking of intestinal obstruction let me say in passing that the first thing to do in dealing with this emergency is to look for a strangulated hernia

The acute traumatic abdomen is seen often enough particularly in our large hospitals to warrant consideration in this discussion There are two kinds of *traumatic abdomen* the one where the abdominal walls have been penetrated and the other where they show no evidence of injury The former is the more common in civil practice but less common than formerly In the treatment of the acute traumatic abdomen with penetration of the abdominal wall with or without serious symptoms it is a sound surgical principle first to make sure that the peritoneal cavity is not involved and this can be done only by exploration No harm can result from this practice while to omit it may entail serious risk to life In the non penetrating case in the absence of symptoms or signs expectant treatment may be resorted to But even when the abdominal wall shows no injury and there is no reasonable certainty that there is no intra abdominal injury the abdomen should be opened This may seem rather radical but permit me to say that my experience bears me out in *this statement for I have oftentimes operated* in such instances against advice and have found several small hæmorrhages or a divided intestine and the like

I have known patients to bleed to death where there was a temporary arrest of the hæmorrhage by pressure of a blood clot This is indeed a calamity

Internal hæmorrhage of the non traumatic acute abdomen often results from bleeding from a ruptured tubal pregnancy It is well known that rupture of the fallopian tube at the uterine junction is very serious operation cannot be done too early A famous Philadelphia pathologist and at one time coroner's *physician was in the habit of telling his stu*dents that the cases with rupture at this point were the ones on which he operated while rupture distal to the uterus including tubal abortion were the ones operated upon by the surgeon Where there are signs of ruptured tubal pregnancy I always operate at once and rarely have to give even in very bad cases an infusion of salt solution One of the surgical principles in the presence of a bleeding vessel is to tie the vessel I cannot understand the practice of waiting for the patient to react when he is bleeding that is to say waiting for the formation of a blood clot or mass of blood clots to arrest the bleeding This is not the practice of the general surgeon but of the specialist and I have no hesitancy in saying that the practice courts disaster

In endeavoring to decide for or against the possibility of intra abdominal injury the pain is not so much of a guide as the character of the pulse and the rigidity If after rest in bed and recovery from the initial shock the early rapid pulse of low tension persists suspicion of hemorrhage should be aroused

Abdominal protective rigidity with localized tenderness is an unmistakable sign of intra abdominal injury If in addition there is flatness on percussion with movable dullness and the rapid pulse and other signs of internal bleeding operation cannot be done too soon The blood pressure and the blood count should be taken at once and preparation made for blood transfusion I believe it to be a loss of valuable time to wait too long for the patient to react One word more to abdominal rigidity It may be either generalized or localized over a small area The latter often occurs in late cases of gun shot wound where a lateral wound has involved only the colon and abscess is in process of formation From war surgery we learned that absence of rigidity is considered an unfavorable sign since it is usually associated with extensive lacerating lesions of the small and sometimes the large intestine in cases that come under observation from 10 to 12 hours after being wounded

The absence of vomiting should not mislead one to believe that there is no internal injury If the injury is received on an empty stomach vomiting may be omitted from the picture

In opening the acute abdomen the incision is usually a low one through one or the other rectus muscle After the muscle has been split some idea may at once be gained of what one may expect to encounter Tension of the transversalis fascia and of the underlying peritoneum may be due to gas but it may also be due to intestinal distention discoloration of the extra peritoneal tissue should suggest retroperitoneal rupture of some part of the bowel and if the transversalis fascia is bile stained rupture of the gall bladder or the duodenum should be thought of A dark purple hue to the peritoneum indicates intra peritoneal effusion of blood It is for this eventuality that one should be on guard for with the opening of the peritoneum there may be a gush of blood and the release of a clot may cause additional hemorrhage

In exploring the traumatic abdomen when the source of hemorrhage is not apparent it is good practice first to examine the liver and the spleen and if these are not involved to proceed to look for injury to the outer coat of the stomach or of the intestine or for lacerations of the great omentum the mesentery the gastrohepatic omentum or the mesocolon etc or for possible rupture of a retroperitoneal organ such as the kidney or the pancreas or of some of the retroperitoneal vessels

The liver is more often injured by trauma than the other organs because its tissue lacks elasticity While very often immediately fatal such injury is not necessarily so but immediate operation is essential The incision is usually made on the right side as the right lobe of the liver is injured about five times as often as the left lobe Lacerations in the liver can be sutured without much difficulty except on its inferior surface where packing must be resorted to A search for other injuries can be rapidly made the right kidney especially should be examined as owing to its proximity to the right lobe of the liver it is apt to sustain concomitant injury

Traumatic rupture of the spleen usually occurs in young people probably because of the elasticity of the costal muscles It can scarcely be diagnosed except by early signs of hemorrhage and the history of the accident Peritonitis sets in earlier than in rupture of the liver Conservative surgery of the spleen is a difficult matter especially in the traumatic ruptured spleen since the lesions may be multiple so that splenectomy is the best method and attended with the least risk to life

I will not weary you with details in other possible intra abdominal injuries Suffice it to say that the traumatic like the non traumatic acute abdomen is an emergency case and surgery is in most instances the conservative procedure One of the advantages of the experiences of the late war in the treatment of intra abdominal trauma was the removal of the hesitancy to explore the abdomen This brought about a 10 per cent reduction in the mortality of cases treated late compared with those treated early in the war

RENAL TUBERCULOSIS DURING PREGNANCY

By WILLIAM E STEVENS MD FACS San Francisco
From Stanford University Medical School

ALTHOUGH pulmonary tuberculosis is not uncommon renal tuberculosis is rarely found as a complication of pregnancy Very few cases are recorded in the literature and no one with the exception of James Israel who mentions 2 cases has reported the personal observation of more than 1 case Tuberculosis of the kidney was seen but once in the last 3 103 patients admitted to the obstetrical department of Stanford University Medical School

There seems to be a general impression that the kidneys are more capable of resisting tuberculous infection during pregnancy I do not consider this to be the correct explanation of the infrequency with which renal tuberculosis is diagnosed during this period but believe that many cases are overlooked because of the customary frequency with which urinary disturbances occur during gestation and the failure to make a proper urological examination The urine of every woman should be examined prior to marriage and at frequent interval during pregnancy If pus or blood is present a thorough investigation should at once be made in order to determine their source *Graebke reports* a case in which pus blood and tubercle bacilli were found in the urine from the left kidney during pregnancy Nephrectomy failed to reveal any evidence of tuberculosis Following parturition numerous examinations showed that both kidneys were functionally normal *and no tubercle* bacilli could be found in the urine He concluded that tubercle bacilli can pass through the kidney without causing tuberculous modification The above triad of symptoms however is so unusual in the absence of renal tuberculosis that I believe that this observation may be safely disregarded

The deleterious effect of pregnancy upon tuberculous infections in general has long been recognized and tuberculosis of the kidney is not an exception to the rule This is to be expected because of the impairment of drainage so often present and because of the increased elimination which is demanded of the kidneys during gestation Many pathological conditions for instance a colon bacillus pyelitis which have been in a quiescent state now become activated and resemble acute infections The following 2 cases the first seen in consultation with Dr Chester B Moore and the second in the Women s Clinic of the Stanford University Medical School together with a number reported in the literature serve to illustrate the soundness of this contention

CASE 1 A patient 22 years of age in the fifth month of pregnancy complained of frequent urination A large number of pus cells had been found in her urine 9 months previously Glands had been removed from her neck when she was 10 years old Examination of a catheterized specimen of bladder urine revealed many pus cells and a few acid fast bacilli The function of the right kidney was diminished and the urine contained a large number of pus cells The left kidney urine was microscopically negative The guinea pig inoculated with urine from the right kidney was positive for tuberculosis the one with urine from the left kidney was negative Consent to operate was not obtained until after confinement At delivery 4 months later Dr Moore found the use of high forceps necessary because of the persistent right occiput posterior position of the head The child was normal except for a small infected wound on the left side of the neck from which tubercle bacilli were recovered This healed in 3 weeks but in a short time a gland on the same side of the neck suppurated Examination of the discharge revealed a large number of tubercle bacilli The baby died 8 months later of tuberculous meningitis The mother is apparently free from tubercular infection at the present time 20 months after nephrectomy

CASE 2 A patient 30 years of age in the second month of pregnancy entered the Stanford Women s Clinic complaining of frequent urination pain in the right lumbar region radiating to the bladder and blood in the urine These symptoms were of 1 ½ years duration but had increased in severity since conception Both of her parents and two sisters had died of tuberculosis Cystoscopic examination revealed a much diminished bladder capacity an inflamed bladder mucosa and an irregular eroded

right ureteral orifice The guinea pig inoculated with the right kidney urine was positive for tuberculosis that inoculated with urine from the left kidney was negative Marked improvement followed nephrectomy the patient gaining 20 pounds in weight Abortion occurred 2 months later Four months after operation tuberculosis of the remaining kidney was found

While a correct diagnosis is obviously of great importance the question of treatment is of more interest in the consideration of renal tuberculosis during pregnancy I am in accord with the majority of urologists who have written upon this subject in the opinion that regardless of pregnancy nephrectomy is always indicated as soon as the diagnosis is made if the infection is limited to one kidney The focus of tuberculosis is thus abolished and the opposite kidney is relieved of a source of irritation which later may produce grave symptoms during the course of the pregnancy and puerperium Of importance also is the probability that the intensity of the vesical symptoms characteristic of tuberculosis is at times capable of inducing premature uterine contractions These facts should be given more consideration than the argument that all of the work is thrown on the remaining kidney if one is removed

A review follows of 35 reported cases of nephrectomy during pregnancy for pathological conditions other than tuberculosis

Of the 34 patients in whom the result of operation was mentioned 2 died and 1 suffered from a slight attack of uræmia The month of pregnancy in which operation was performed was stated in 30 cases as follows 4 in the second month 7 in the third month 6 in the fourth month 7 in the fifth month 2 in the sixth month 2 in the seventh month 1 in the eighth month and 1 in the ninth month The effect on pregnancy was mentioned in 26 cases Of these the pregnancy continued to term in 17 labor was induced in 2 abortion occurred in 6 and the fetus as well as the mother died in 1 case The child was normal in all of the 17 cases continuing to term

A rather extensive search of the literature revealed but 16 cases in addition to our own 2 cases of tuberculosis of the kidney complicating pregnancy

CASE 1 Reported by Israel Surg Clin for Renal Diseases viii 0 The patient aged 20 was in the fourth month of pregnancy Recovery of the mother and delivery of a normal child at term followed nephrectomy Several normal accouchements followed

CASE Reported by Israel Surg Clin for Renal Diseas viii 37 The patient was 3 years of age The month of pregnancy was not stated Recovery of the mother followed nephrectomy The effect on pregnancy was not stated

CASE 3 Reported by Doebl Inaug Diss Kiel 1915 Abstracted by Jaeger in Zentralbl f Gynaek The patient age and month of pregnancy not stated recovered following nephrectomy Spontaneous abortion followed the operation

CASE 4 Reported by Hornstein Ztschr f gynaek Urol Leipz 1909 1910 ii 220-233 The patient aged 22 was in the sixth month of pregnancy Recovery of the mother followed nephrectomy Abortion occurred 19 days afterward the *child living 10 minutes*

CASE 5 Reported by Mirabeau Monatschr f Geburtsh u Gynaek 1906 xxiii 19/-20 The patient age not stated was in the fifth month of pregnancy Recovery of the mother and delivery of a normal child at term followed nephrectomy

CASE 6 Reported by Fillet (of Rouen) and Delaforge Ass franc d urol Proc verb Par 1910 xiii 50-511 The patient aged 23 was in the sixth month of pregnancy Recovery of the mother and delivery of a normal child at term followed nephrectomy

CASE 7 Reported by Petrard (of Boulogne) Abstracted by Fillet Ass franc d urol Proc verb Par 1910 xiii 507-511 The patient aged 31 was in the third month of pregnancy when the infection was discovered No operation was performed and *the patient died in the eighth month of pregnancy*

CASE 8 Reported by Pilz Abstracted by Fillet Ass franc d urol Proc verb Par 1910 xiii 507-511 The patient age not stated was in the fourth month of pregnancy Recovery of the mother and delivery of a normal child at term followed nephrectomy

CASE 9 Reported by Nicolich (of Trieste) Abstracted by Fillet Ass franc d urol Proc verb Par 1910 xiii 507-511 The patient aged 30 was in the third month of pregnancy Recovery of the mother and delivery of a normal child at term *followed nephrectomy*

CASE 10 Reported by Boeckel Ann de gynec et d obst Par 1913 2 s x 145 151 The patient age not stated was in the third month of pregnancy Recovery of the mother followed nephrectomy A dead child was delivered at 7 *months* The cause of death of the fetus was *not* attributable to the nephrectomy

CASE 11 Reported by Boeckel Ann de gynec et d obst Par 1913 2 s x 145-151 The patient age not stated aborted in the second month of pregnancy No operation had been performed

Case 12 Reported by Keen Abstracted by Smith J Deutsche med Wchnschr 1901 xxvii 821 Tuberculosis of the kidney was discovered in a patient aged 25 in the second month of pregnancy She was delivered at term of a normal child One kidney had been removed 1 year before because of renal tuberculosis

Case 13 Reported by Norman Bridge Jr Boston Med and Surg Journ 1902 cxlvi 249 The patient was in the fifth month of pregnancy Nephrectomy was performed The fetus was born at term

Case 14 Reported by Goodell Surg Gynec & Obst 1915 xx 634 The patient was in the fifth month of pregnancy Recovery from the nephrectomy was uneventful but she died of tuberculosis of the lungs later

Case 15 Report by Hartman (Ann of Surg 1916 lxiii 1) The patient was in the fifth month of pregnancy Recovery from the nephrectomy was uneventful but she died of tuberculosis of the lungs later

Case 16 Reported by Sears Abstracted by Hayes Schwerin Wchnschr 1911 xxiv 1155 The patient aged 24 had recovery after delivery No operation was performed in this case

Case 17 Reported by Stevens The patient aged 22 was in the fifth month of pregnancy when the infection was discovered No operation was performed The mother survived delivery of the child at term The kidney presented a tuberculous sinus from which tubercle bacilli were recovered 18 months later of tuberculous meningitis

Case 18 Report by Stevens The patient aged 30 was in the second month of pregnancy Recovery from the nephrectomy followed Abortion occurred 2 months later

Summarizing the cases of 12 patients nephrectomized for renal tuberculosis during pregnancy the results were as follows All of the nephrectomized mothers recovered Normal children were delivered at term in 6 of the cases in which the effect on the pregnancy was mentioned Abortion occurred in 3 but not until months after operation in 1 of them The possibility of self induced abortion must be considered in this case Another patient was delivered of a dead child at 7 months but this was 4 months after nephrectomy and death was not due to the operation The month of pregnancy in which the tuberculous kidney was removed was mentioned in 10 cases and was as follows 1 in the second month 2 in the third month 2 in the fourth month 2 in the fifth month and 3 in the sixth month The result of pregnancy on the renal tuberculosis is noted in 5 nephrectomized cases Exacerbation of the condition occurred in 3 death resulted in the eighth month in 1 No noticeable change was observed in 1 Paul Huessy states that Wildbolz Kapammer and Zangemeister each reported a case in which tuberculosis of the kidneys was apparently but slightly influenced by pregnancy The result of the tuberculous infection on the course of pregnancy and on the child in 4 cases not nephrectomized was as follows Abortion occurred in 2 instances 1 child was infected at birth and subsequently died of tuberculosis 1 normal child was delivered at term

A study of these statistics demonstrates the advantage to both mother and child of immediate nephrectomy in the presence of unilateral renal tuberculosis complicating pregnancy In this connection the hypersensitiveness to infection of the offspring of tuberculous parents should be considered Norris found that there was an average infant mortality of 58.3 per cent of children born of tuberculous mothers If our first patient had been nephrectomized at the time the renal tuberculosis was discovered the child would probably have escaped the subsequent infection

From the above series of cases the conclusion may be drawn that pregnant women can tolerate nephrectomy well and that this operation for renal tuberculosis is no more serious for mother and child than nephrectomy because of other pathological conditions of the kidneys during pregnancy Following the removal of a tuberculous kidney tuberculin should be administered the urine examined at frequent intervals for a considerable period of time and the patient kept under observation Pregnancy is permissible if the remaining organ is free from tuberculosis and functioning normally after a period of over 3 years

In 6 cases recorded in the literature together with 4 of his own cases of pregnancy occurring in nephrectomized women Matthews found that there were 10 normal and 5 complicated labors with but deaths

In the presence of bilateral involvement properly administered tuberculin treatment

together with general hygienic measures are indicated Regardless of the moral or religious aspects of the question I do not believe that sacrificing the child by terminating pregnancy is justifiable as at best the mother s life is prolonged but a short time by this procedure

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THE CLOSURE OF LARGE FEMORAL AND INGUINOFEMORAL DEFECTS

THE RESULT OF DESTRUCTION OR RELAXATION OF POUPART'S LIGAMENT[1]

BY EDMUND ANDREWS M D F A C S CHICAGO

POUPART S ligament is a foundation upon which the whole strength of the anterior abdominal wall rests In view of its evident importance it is strange that studies on its development are few and quite contradictory

Phylogenetically the picture seems very clear The continuous fascial plane made up of the external oblique aponeurosis and the fascia lata becomes fastened to the anterior superior spine of the ilium and the pubic spine In all mammals except the primates the thigh has a short range of motion in an acutely flexed position This sharp folding of the fascial planes would seem to be all that exists in the way of a ligament The very fact of hyperflexion precludes the possibility of any herniation of abdominal viscera into the thigh This fascial plane is in reality a degenerated muscle In man a rather variable upper part persists as muscle In dogs the variation is much more marked often the entire fascia lata is represented by a thin plate of muscle In the larger mammals fascia tends to predominate

Contrast the above with what little we can glean from human embryology The pelvic girdle in its simplest terms is a straight bar of mesoblastic tissue The cephalic end represents the ilium and the caudal end the pubis and ischium These latter remain fused in primitive forms This bar rotates so that its iliac end gains a vertebral attachment while the other end becomes forked making a notch for the obturator nerve These pubic and ischial elements later rejoin to make the obturator foramen and finally fuse in the mid line and the symphysis pubis is formed Even before this stage however a splitting off of the anterior iliopubic border occurs to enclose a femoral canal This can be seen in an 18 5 millimeter embryo (Fig 1 taken from Keibel and Mall s *Human Embryology*) Thus Poupart s ligament can be distinguished long anterior to any muscle or fascial differentiation

This latter fact is more in accord with anatomical findings It has often been stated that the ligament is really only a fold and can be excised and laid out flat that is unfolded This I am able to state is positively not true Not only in man but also in dogs and cats such excised strips show a definite well developed ligament which cannot be unfolded

CAUSES OF DESTRUCTION OF THE LIGAMENT

Destruction of Poupart s ligament may occur from a number of different causes Partial destruction produces almost as complete a suspension of its function as complete destruction as the relaxation that ensues completely ruins it as a weight bearing structure Its congenital absence has never been reported The causes of destruction are the following

1 *Trauma* The ligament may be injured by penetrating or lacerated wounds Simple section of the tight band will be followed by wide retraction of the ends

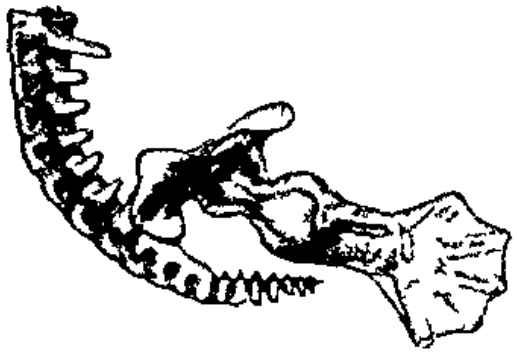
2 *Infection* may be the result of abscess of the glands in the groin psoas or even appendiceal abscess

3 *Surgery* (a) In the absence of hernia In extensive block dissections of inguinal and iliac glands in malignancy

(b) Willful section in operations for femoral hernia in order to permit reduction Gimbernat s ligament is usually sacrificed first in such cases but this may not be sufficient and the ring may have to be enlarged in an anterior direction as well

(c) By too tight stitching or infection in operation for either inguinal or femoral hernia I have seen this occur after attempts to bring the rectus muscle over too forcibly in a direct hernia and Twyman (12) suggests that such

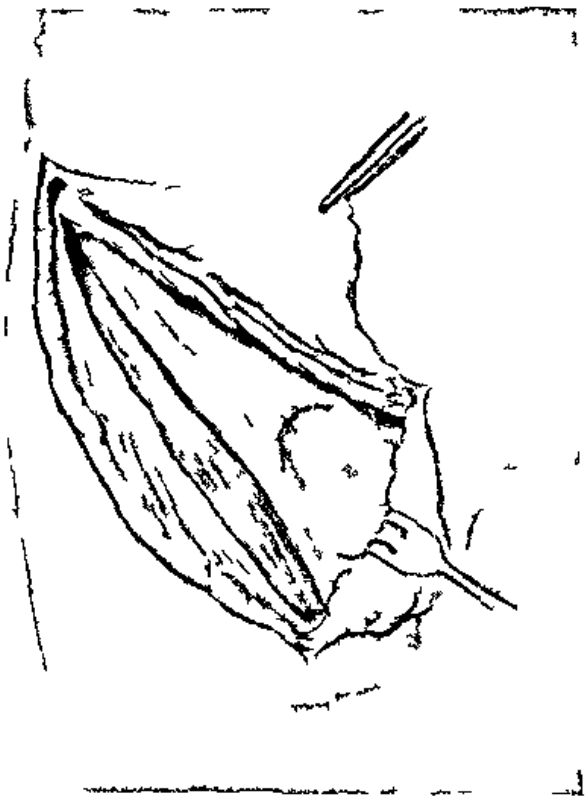
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procedures as the Roux operation for femoral hernia may cause it This con ists in forcibly approximating the ligament to the bone be neath it with iron staples

I want here to call attention to the fact that in the absence of hernia loss of the inguinal ligament is a far less serious lesion The real protection against hernia the endo abdominal fascia is intact and not stretched or perforated and there is far less danger of hernia formation Bloodgood (3) reports success in using the pectineus muscle to re

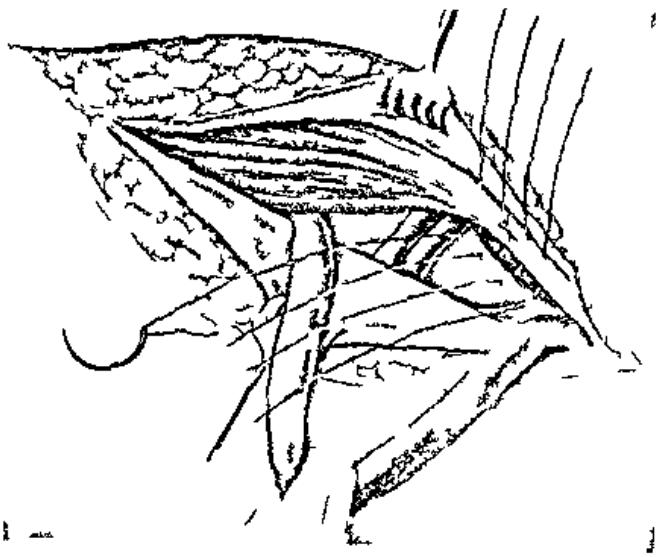


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place a Poupart s ligament which he removed surgically during a block dissection of malig nant glands He suggested its u e in hernia as well but did not try it From my ob erva tions such a flabby structure would be of very little value in ca es of real hernia where extreme pres ure must be combated although Twyman (12) reports its use in one ca e as a reinforcing pad over his line of stitches



F 4 F om St tt t f o jo d t ndon t Cooper s l g ment l g l r t



Fig 5 Sa f e rmo s femoral h rn d ssected f e

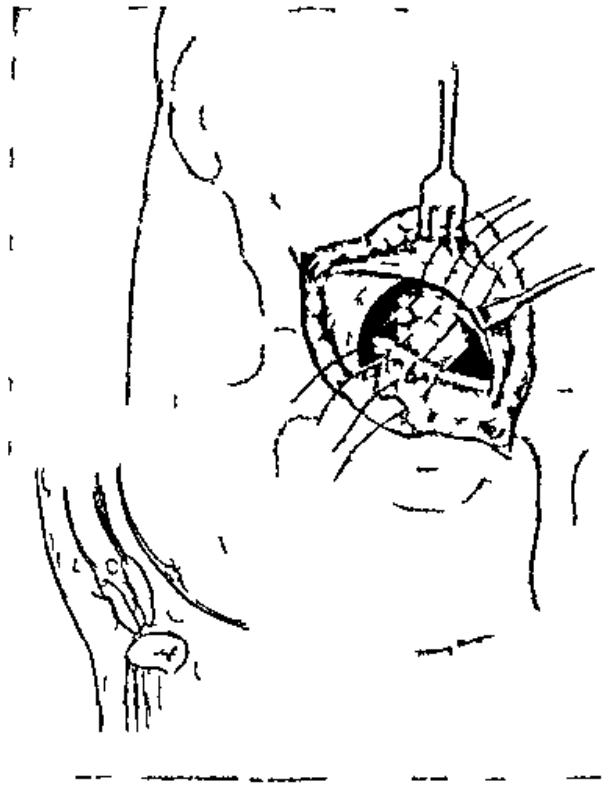


Fig 6 Access t onj i ed t d n from Scarpa s tr ngle by tra t g la P p ts lgam t S tu f co j i ed t don to bo

However only the real hernia will be dealt with in this paper

Allow me to make it very clear that the class of procedures dealt with are not applicable to all hernia In most femoral hernia which tend to be very small I believe that very little surgery is needed Simple removal of the sac followed by skin closure is ample in most cases This procedure has demonstrated its worth in Ochsner s hands (8) and has lately been ably defended by Russell (10) At the most one or two simple stitches in the borders of the ring may be needed *It is only for the unusual cases that* the measures below described are warranted

CLASS I PLASTIC METHODS

CASE 1 A young man with small oblique right inguinal hernia was operated upon thr e times in 11 months In two of the operations infection re sulted one was clean Each time the hernia re curred larger than before No Poupart s ligament was found at operation A free strip of fascia lata was sewed into the pl ce of Poupart s The wound he led by first intention Total failure was d e to general rela ation The case was deemed nope able

CASE 2 A man age 47 had an enormous hernia for 20 years An unsuccessful operat n had been *perfo med 18 years ago The fascia of the upper* th rd of the sartorius was stripped off and swu g o er and sewed onto the pubic sp ne The conjoined tendon and external oblique were sutured to thi new ligament A 50 per cent success resulted in considerable diffuse bulging Reoperation was ad vised but refused (Fig 2)

CASE 3 A young man with large inguinofemoral recurrent hernia was operated upon as in Case 2 e cept that the strip of fascia was twisted in the h pe of gaining tens on Th result wa much bet ter but far from perfect Three months later a small incision w s made over the new l gament and a figure of 8 stitch made to tighten it (Fig 3) The *result was good but I have heard s nce that there is* consid rable bulging over the ld scar

I am inclined to believe that these plastic operations are of little avail and that the end result will always be a gradual stretching of any new ligament that we can construct

CLASS II SUTURE OF THE CONJOINED TEN DON TO THE PUBIS

Wise (13) had the germ of this idea when he suggested carrying the regular Bassini stitch very deep on through Poupart s ligament so

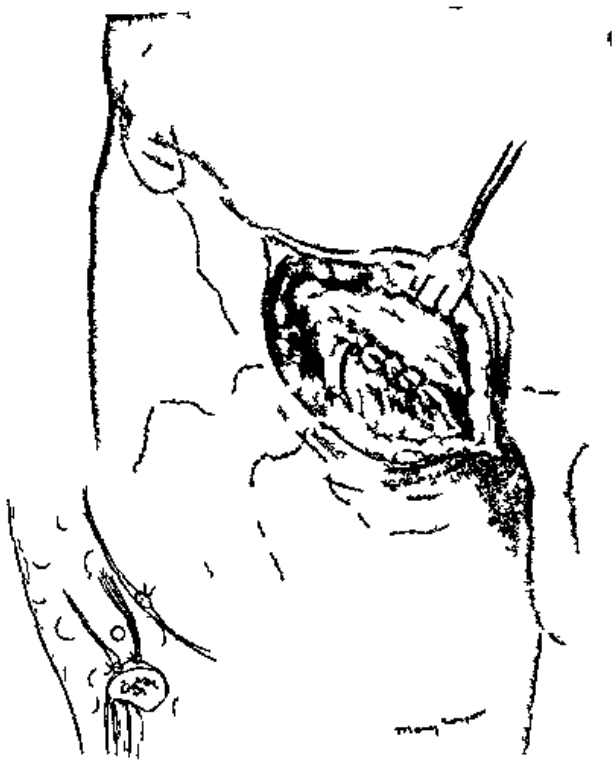


Fig 7 Showing method of attaching Poupart ligament to pectineus fascia

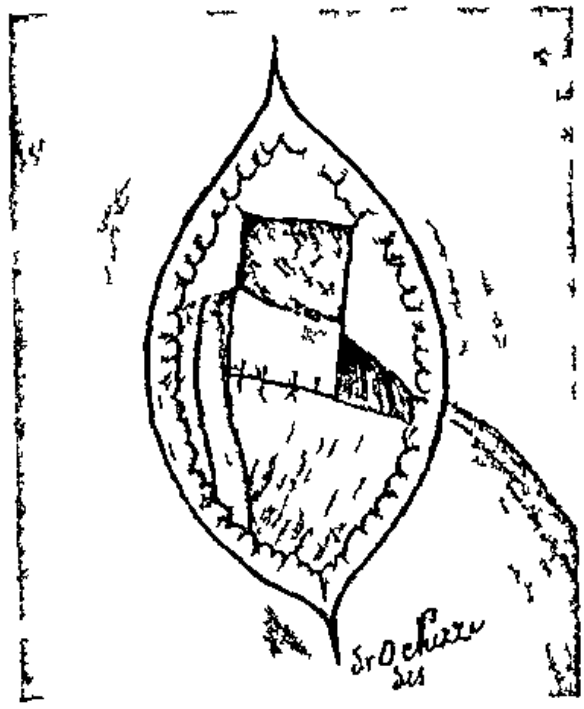


Fig 8 Femoral Bile Flap fe tern l bl que turned out w d a cover f femor l canal

as to include a bit of the pectineus fascia Groves (4) advocated deliberate section of Poupart s ligament so as to gain access to the conjoined tendon from the femoral canal He then sutured it to the periosteum of the pubis I do not regard such a procedure in any way warranted as all our efforts should be directed toward the preservation of this all important structure Stettin (11) used the inguinal method of approach (Fig 4) This procedure has most obvious advantages in this type of work as it bridges across beneath Poupart s ligament and most effectually replaces it It seems to me that where such a radical procedure is really needed the femoral route is the better If Poupart s ligament is intact such a radical procedure is unnecessary If Poupart s ligament is very lax we can gain access to the conjoined tendon beneath it I have accomplished this in 2 cases

CASE 1 A woman of 37 with strangulated femoral hernia was operated upon one year before Prompt recurrence followed An incision over the tumor showed that the previous operator had not only completely sectioned Poupart s ligament but had also cut the external oblique aponeurosis for about inch Attempts to suture the defect proved futile as the stitches pulled through the parallel fibres The ligament was then retracted upward and the conjoined tendon (a very strong one) secured beneath it This was easily pulled down and sutured with 2 kangaroo tendon stitches to the dense fibrous tissue over the ileopectineal line of the pubis (Cooper s ligament) No attempt was made to repair Poupart s The result was perfect

CASE 2 A hunchback man age 54 with marked scoliosis had an enormous hernia the size of an adult head This was diagnosed a direct inguinal At operation it proved to be a femoral with a markedly stretched and relaxed Poupart s ligament The same operation was done with the addition of suturing the relaxed ligament to the fascia lata The result was perfect (Figs 5 6 and 7)

In both of these cases the technical difficulties were very slight and the results appeared far stronger than by any other method known to me The canal is stopped at its upper end No pocket is left and a firm buttress is built even above the abdominal end of the canal Stettin s method of approach is open to the objection of greater operative difficulty In spite of the recent flood of literature on the subject I am far from convinced of the advisability of adopting the inguinal route as a routine Each time I have tried it I have got through with the feel

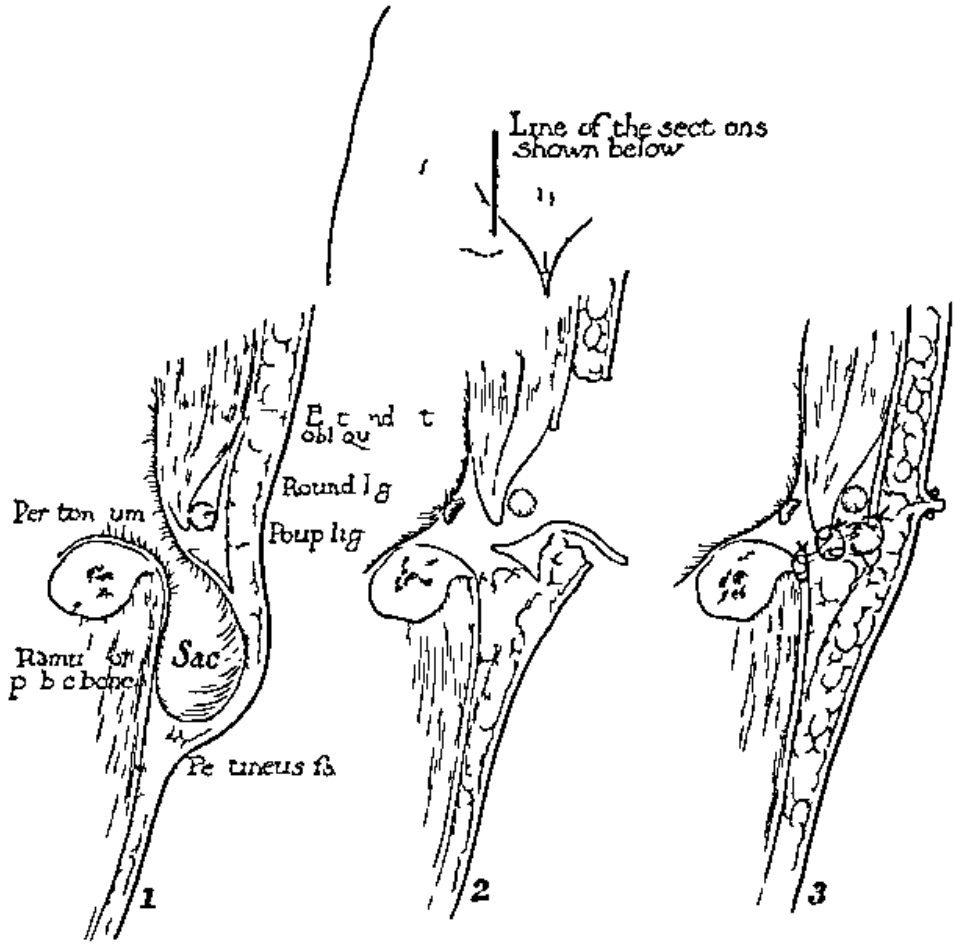


Fig. 9.—1, Cross section of femoral canal through gland. 2, Lower fragment of turned-in flap of external oblique aponeurosis sutured to Cooper's ligament. 3, Closure of internal oblique.

ing that I have done an unnecessarily big operation. Aside from such considerations it is evident that in the class of cases being considered here the operation can be done far more easily from below.

CLASS III. AUTHOR'S METHOD

Suture of turned in flap of external oblique aponeurosis to Cooper's ligament.

The great objection to the above method (Class II) is that in most cases where it is indicated it is utterly impossible. The reason is that the conjoined tendon is often congenitally deficient or its lower fibers have been destroyed by too tight stitching. A loose flabby mass of red muscle is of no use, especially if instead of being inserted into the pubis it is attached to the lateral border of the rectus sheath ¾ centimeter higher up (Polya, 9). In such cases the operation previously described by me (1) has been used successfully. If the aponeurosis of the external oblique is intact it can always be done. The only previous mention of the use of this structure in the cure of femoral hernia is by Bile (2). He turned a flap outward and sewed it to the pectineus fascia, thus closing the canal at its lower end (Fig. 8). It was successful in cases of small femoral hernia. As can be seen, the hole left is rather awkward to close.

In the technique I use the inguinal canal is opened and the upper end of the femoral ring cleared and the sac dealt with according to the usual method variously ascribed to Moschcowitz (7) or Lotheissen (6). The next step is the turning in of the lower flap of the external oblique aponeurosis and suturing it to Cooper's ligament or the periosteum of the pubis. The external and internal obliques are

then drawn and sutured to the remains of Poupart s through the lower turned in fragment of the external oblique (Fig 9) We thus have a closure of the canal at its upper end by a strong fibrous membrane which can be laid in without the lightest tension I do not believe the inguinal canal is appreciably weakened and no bulging has been noted in any of the 9 cases in which the operation was done by this method (4 operations by the author 5 by Dr E W Andrews) Three of these were on very large hernie

CONCLUSION

1 In ordinary femoral hernia simple removal of the sac with a minimum of stitching is all that is needed

2 In large inguinofemoral hernie plastic methods are not satisfactory and should be used only as a last resort

3 If the conjoined tendon is well developed its suture to the pubis offers the best chance of cure

4 In the absence of a strong conjoined tendon the canal is best closed with the turned in fragment of the external oblique aponeurosis

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THE TREATMENT OF STAPHYLOCOCCUS AND STREPTOCOCCUS MENINGITIS BY CONTINUOUS DRAINAGE OF THE CISTERNA MAGNA

By WALTER E DANDY M D Baltimore Maryland
From the Department of Surgery the Johns Hopkins Hospital and the University

THE operative treatment of so called septic meningitis—that in which streptococcus staphylococcus aureus and albus pneumococcus influenza bacillus and other rarer organisms are the infecting agents—has gained little favor with the passing years Periodically new operations have been suggested and quickly passed from view ofttimes the same procedures have reappeared as seemingly new conceptions only to meet a fate similar to that of their earlier entries Nor have the results been sufficiently noteworthy to maintain the enthusiasm even of the original promoters Despite the fact that the operative possibilities almost seem to have been exhausted no impression has been made upon the terrific mortality of this disease

Surgical efforts toward the treatment of meningeal infections had their crude beginnings even as far back as the time of Percivall Pott (33) in 1760 A century before the bacterial origin of infection was known we find in his writings a remarkable exposition of the clinical picture of meningitis which he recognized as a putrefaction of the membranes and he evidently made a most enthusiastic and persistent effort to prevent and *cure meningeal infections by surgical measures* Needless to say in those days when confidence was placed in phlebotomy purging and other vagaries the radical surgical teachings of Percivall Pott would receive cant recognition and it is just as well for despite his superior insight into this disease and his surgical confidence he far overstepped the mark in treatment There were so many additional factors—surgical pathological and bacteriological—which he could not know and which only now a century and a half later are appearing in the light His reasoning was excellent but his premises defective yet the surprising thing is how much he knew The following excerpt from his publication on the results of fracture of the skull might almost be from a modern publication And putrefaction of that membrane tho least taken notice of by modern writers is a more frequent cause of bad symptoms and of death than all the others put together Almost equally modern are his impressions on the results of the treatment The very terrible symptoms which sometimes follow very slight blows on the head and the little power of art in many cases to resist or to remove them contribute to make this a very melancholy part of practice and to render the smallest acquisition of knowledge worth all our trouble

His efforts at treatment were all directed toward the seat of the fracture from which the putrefaction was known to have originated And so great was his fear of the impending danger of involvement of the brain and meninges that he urged the routine operative exposure and drainage of all fracture wound even fissures as a preventative procedure A century later Gross (20) in 1873 after experiences in the American Civil War was still strongly urging the teachings of Pott The treatment of compression of *the brain from effusion of pus is purely surgical* and all authors are unanimous in the opinion that unless the matter can be evacuated the patient will die although they are equally agreed that this measure holds out little chance of life No case is recorded of recovery from effusion of pus into the arachnoid cavity without its having been let out on the other hand if a free incision be made into the dura mater so as to admit of its ready escape one half of the patients as I have just shown fight their way through The necessity of operation is therefore not to be questioned The cases cited by Gross however are of abscesses or localized cerebral infections beneath fractures of the skull The

treatment of meningitis as a distinct clinical entity probably begins with the great Victor Horsley (22) in 1890 He applied the principle of drainage (long since secure for many infections) to the cerebrospinal spaces In addition he introduced irrigations of the spinal subarachnoid space with mild antiseptic solution Horsley's treatment in one case was continuous drainage of the spinal canal after laminectomy and in another irrigation of the spinal canal from the lumbar region to the cisterna magna with his favorite antiseptic—bichloride of mercury His principle of treatment and results are expressed in the following quotation I put down septic meningitis as a condition which might be improved by operation such as free drainage and irrigation with warm disinfectants I do not however believe that this course will always successfully rescue these otherwise hopeless cases In fact I have operated but both the moribund patients succumbed after temporary but marked remission of their symptoms Twenty years later before a German neurological congress (23) in 1910 he still advocated the same treatment but in the brief note at that time there is no mention of successful results during the long interval after his first announcement

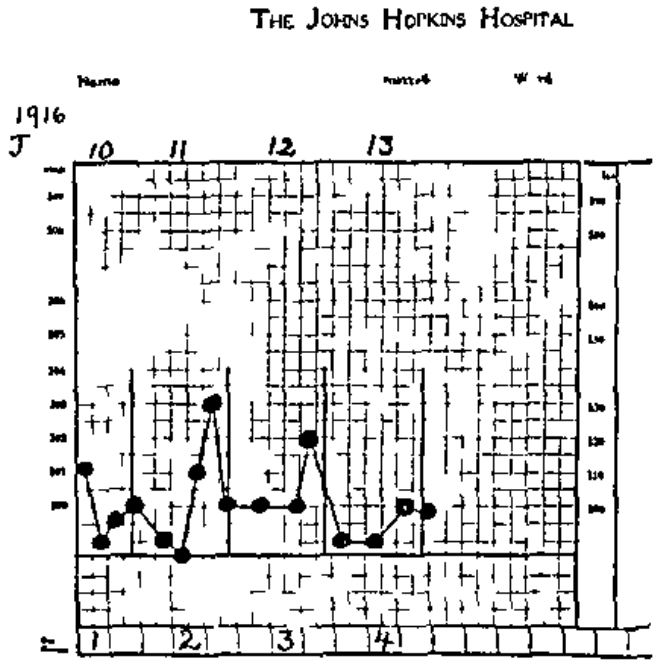


Fig 1 Temperature chart of a patient with staphylococcus aureus meningitis with spontaneous recovery high white mild the course may be

Since Horsley's unsuccessful effort three types of treatment have been tried (1) repeated lumbar punctures (intermittent drainage) (2) continuous drainage from (a) the spinal canal (b) the cisterna magna (c) the pontine cisterna (d) the lateral ventricles (e) the subarachnoid space in the parietal region and (3) irrigations of the subarachnoid

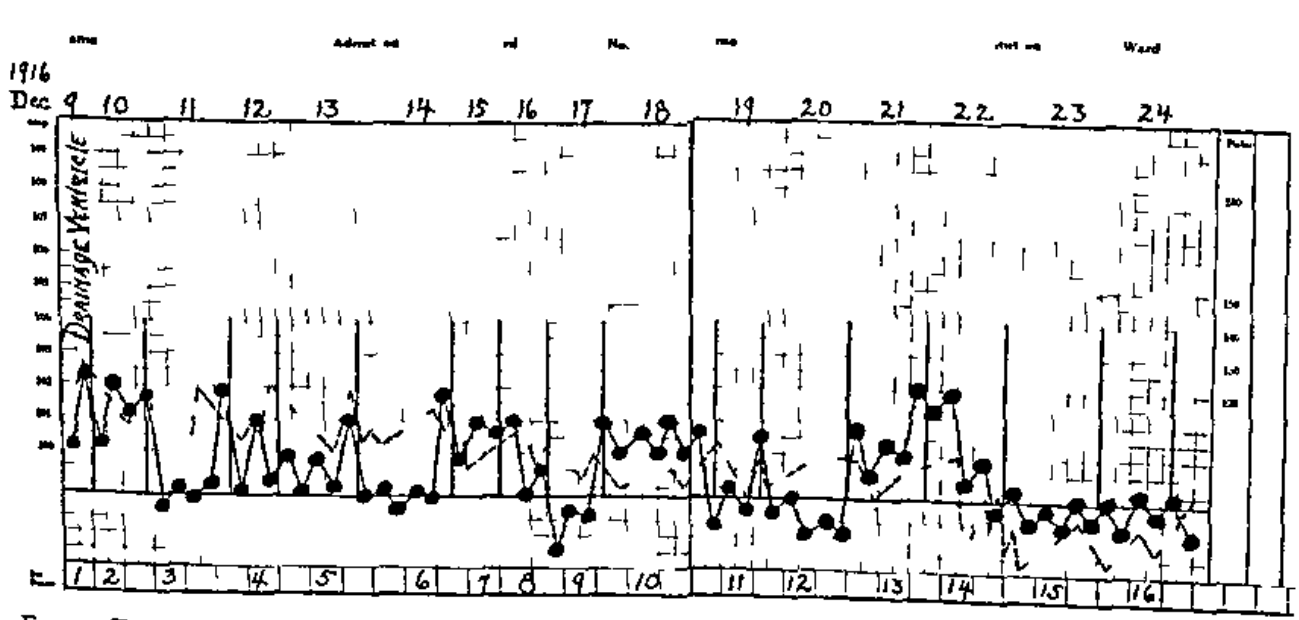


Fig 2 Temperature chart showing course following ventricular drainage in case of staphylococcus aureus meningitis following post traumatic focus of right occipital lobe

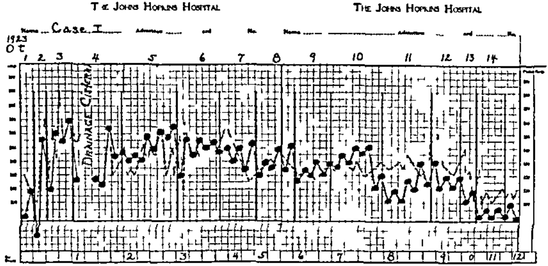


Fig 3 Temperature chart to show course following external drainage in patient with staphylococcus aureus meningitis following fracture of the skull (Case 1)

space by bland or antiseptic solutions As mentioned before none of these methods has demonstrated any outstanding superiority over the results when the case is left to nature With very few exceptions each report carries only one or two cures

There is a very general impression that all forms of septic meningitis are almost universally fatal If this were true the reported cures even though scattered might be considered the result of the procedure advanced But although the mortality is extremely high spontaneous cures do occur a fact which makes it open to doubt whether many recoveries—including my own—have really not occurred in spite of rather than because of treatment Indeed some forms of therapy are so vigorous and many so devoid of surgical and physiological reasoning that one is forced to the conviction that actual damage has been added to very sensitive tissues which need all their strength to combat the infection

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LUMBAR PUNCTURES AS TREATMENT

Surely periodical withdrawal of infected cerebrospinal fluid by occasional even frequent lumbar punctures cannot have more than a minimal and transient beneficial effect in the acute phase of meningitis This impression is based not only upon observation of puncture in meningitis but upon analogy with aspiration of empyema or other localized infections elsewhere In the more chronic phase in which pressure is the conspicuous feature of the symptoms it is probable that sufficient benefit may be obtained to tide the patient over for a definite period I have repeatedly seen distinct benefit following each puncture in a case which developed from an operative infection though it was employed only after continuous drainage had been discontinued Several cures of acute septic meningitis have been reported among which may be mentioned cases by Kuemmell (25) in 1905 Netter (31) in 1909 and Tedesco (42) in 1910 In pneumococcus meningitis Lamar (6) collected 13 cures in 10 of which only lumbar punctures were used Royster (37) added two more One cannot but believe that these cases might have recovered if left alone This feeling is intensified by the fact that only a few punctures were made

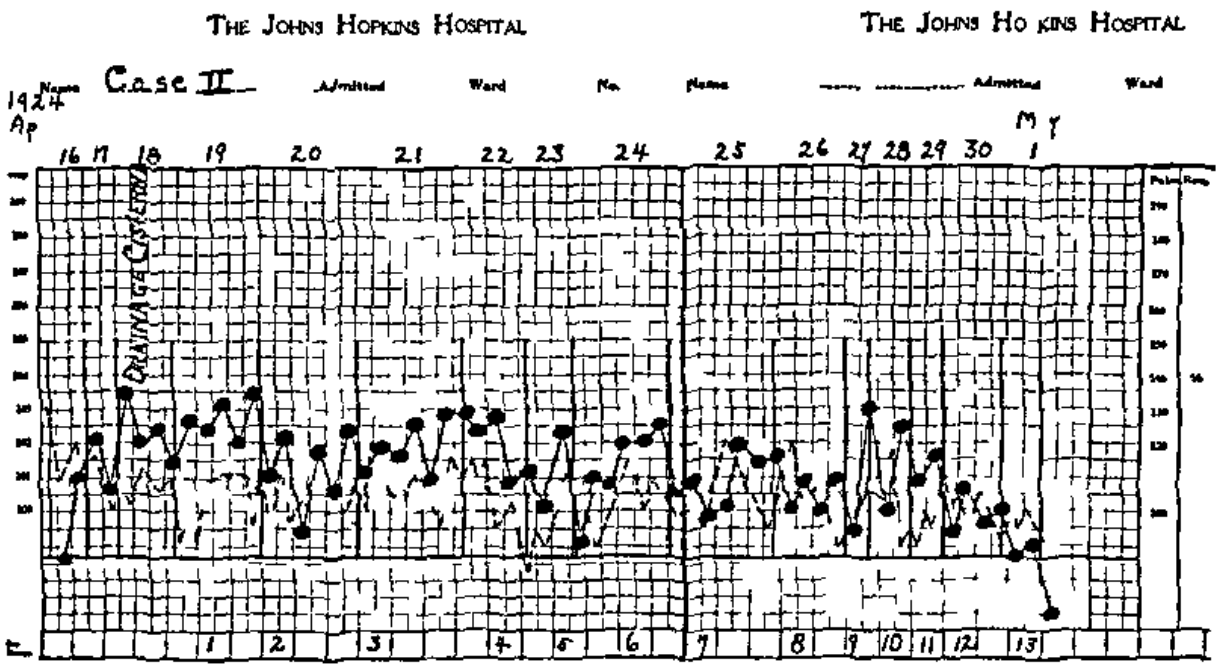


Fig. 4. Temperature chart of Case 2, staphylococcus aureus meningitis showing course of temperature and pulse following drainage of the cisterna magna.

MECHANICAL IRRIGATIONS

Horsley's irrigation of the spinal subarachnoid space with weak bichloride and his failure in a single moribund case has been mentioned. Barr (3) in 1910 irrigated from the sylvian region to the cisterna magna without result. Day (11) in 1913 washed from the ventricles to the lumbar region and Murphy (29) in 1907 from the lumbar region to the cisterna both using saline solution without results.

Eagleton (14) in 1911 has adopted a much more radical form of irrigation of the meninges with Ringer's solution. He apparently makes multiple openings over the cortex and irrigates in retrograde fashion into the cisterna magna. His initial report of one cure in 3 cases carries little support for a procedure of such magnitude. In view of the harmful effects from irrigation of the peritoneal cavity and of the failure to benefit deep tissue wounds or infected pleural cavities irrigations of the subarachnoid space are at once met with a strong feeling of skepticism particularly when not used in conjunction with continuous drainage. However since *Weed and Wegeforth* (43) have shown that irrigations of the subarachnoid space with a modified Ringer's solution is so far as they can observe in experimental meningitis without harmful effect possibilities from the use of this method must still be entertained. It was their feeling that life could be prolonged by irrigating the spinal canal with Ringer's solution but none of their animals survived. They consider their results suggestive but not conclusive. Exponents of irrigation methods realize that because of free communication through the foramina of Luschka and Magendie the ventricles and the entire subarachnoid space are always infected and that the topography of the cerebrospinal space is such as to make irrigation of more than a fraction of the entire system impossible regardless of the sites of punctures. Any possible results therefore are to be expected solely from a quantitative reduction in the number of infecting organisms. One cannot escape a fear that even Ringer's solution may at times not be so perfectly balanced as to prevent harm to the tissues and even though the injury is not enough to give evidence to our crude tests it may yet be sufficient to favor the growth of organisms. Even though it is granted that a harmful effect is lacking beneficial results could hardly be expected to accrue unless irrigations were continued at frequent intervals.

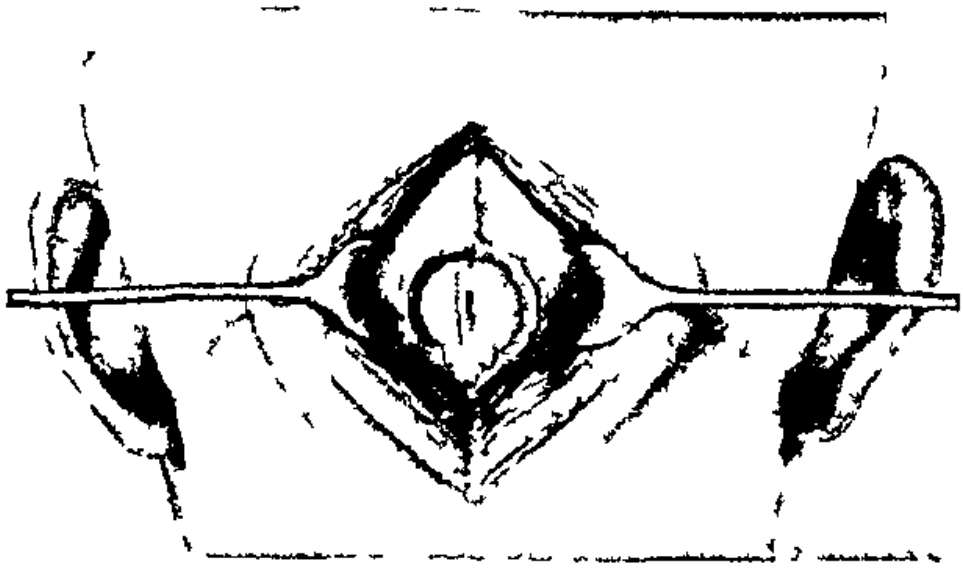


Fig 5 Operative exposure for drainage of the cisterna magna.

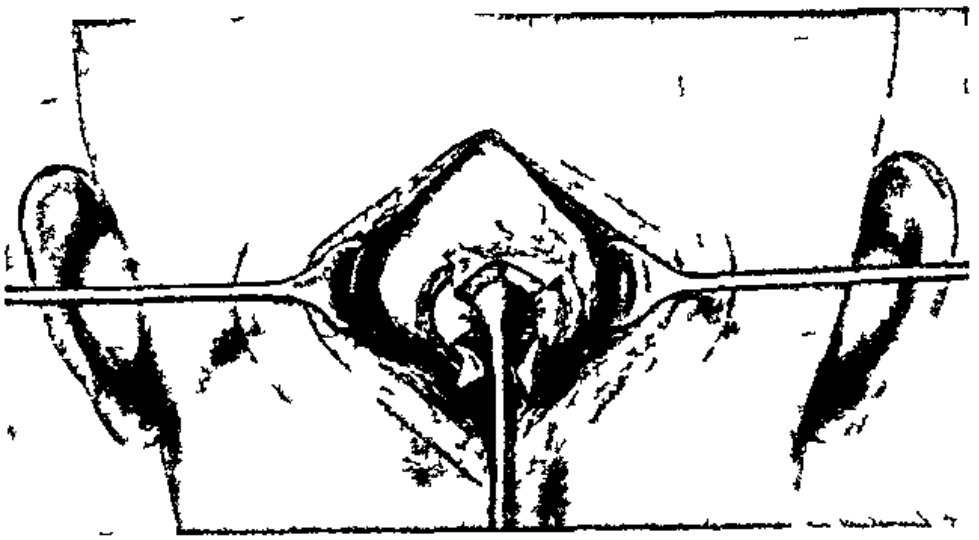
ANTISEPTIC INJECTIONS OR IRRIGATIONS

Attempts to cure meningitis with antiseptic injections or irrigations have doubtless caused injurious rather than beneficial effects The outstanding claims for chemical treatment are those of Franca (17) in 1903 and (18) 1917 his coworker Seager (39) in 1902 with lysol and Wolff (46) in 1915 with protargol but all were dealing with meningococcus meningitis in which Flexner s serum has since completely revolutionized the treatment The remarkable percentage of cures by lysol and protargol—equal to those of Flexner s serum —have not been duplicated by others Recently their claims were carefully examined by Flexner and Amoss (16) with entirely opposite results They tested the bactericidal power of the given strength of lysol and protargol both *in vivo* and *in vitro* and found them to be without any effect Their conclusions were that the chemicals have shown themselves not to be curative but rather to be injurious The chemicals have been shown to be antileukotactic antiphagocytic and indeed to be all poisons of considerable power

Franca also claimed that the bactericidal action of lysol was equally strong for streptococcus and other organisms except pneumococcus but proof of this statement was not given

From the remarkable series of observations by Weed Wegeforth Ayer and Felton (44) of the American Army Neurosurgical Commission those facts pertaining to chemical irrigations are particularly impressive Weed and Wegeforth (43) showed that the chemical irritation even of normal salt solution is so great that following irrigations of the spinal canal in their meningitic cats there were convulsions marked tetany like shaking of the body retraction of the head and neck great general irritability on recovering from the anesthetic and in a very high percentage of cases death quickly followed from respiratory paralysis That the meninges are extremely sensitive to chemicals we (9 and 10) have learned in the use of the phenolsulphonephthalein test for absorption of cerebrospinal fluid If this dye was either slightly acid or alkaline the results in animals were precisely similar to those of Weed and Wegeforth It is for this reason that great emphasis has always been placed upon the use of a perfectly neutral solution

In another series of animal with experimental meningitis Wegeforth and Essick (45) irrigated the spinal canal with many of the commonly used antiseptics and found that none prolonged life With sublethal doses a violent reaction occurs manifested by an extreme increase in the globulin content and cell count The evidence is surely adequate to eliminate from consideration the treatment of purulent meningitis by irrigation of the subarachnoid space by any of the



F 6 Sho ing funnel end of tube s t red to d on e ch s de The tube re main fl sh with the dura a d does not project into the cisterna The dural defect is purp ely made larg r th n th end f the drainage tube and ne tw p gs a e made to the tub as a id t al safeguard again t clo u e of the m uth of the t be

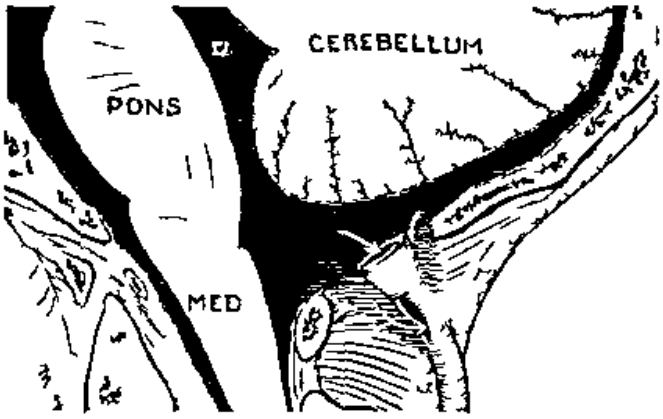
antiseptics which have heretofore been used This is by no means an effort to close the door to future efforts in this direction Despite past and present failures one cannot but feel that the future treatment of septic meningitis may yet lie in antiseptics or sera Though seemingly impossible from our present knowl edge the detection of a specific antiseptic or of a specific serum so accurately balanced as to be without injury to the naked nervous system seems no more unlikely than Flexner s remarkable antimeningococcic serum or the recent brilliant discovery by Sicard (40) that lipiodol could be injected into the subarach noid space cast a dense shadow and still be harmless to the delicate host

RESULTS FROM CONTINUOUS DRAINAGE

The two favorite sites for cerebrospinal drainage are the lumbar spinal canal and the cisterna magna Continuous drainage of the lateral ventricle is difficult hardly practical and except under unusual circumstances [1] never necessary or advisable Attempts at ventricular drainage aside from the fact that they are both unnecessary and impractical lead to unwarranted damage to the cerebral cortex Despite their many curves the ventri cles remain open and drain well into the cis terna magna through the foramina of Luschka and Magendie At least the automatic drain age from the ventricles is much superior to other parts of the subarachnoid space unless or until the foramina of Luschka and Ma gendie become occluded This is a not infre quent sequel in the later stages in many cases of meningitis and of course the resultant hydrocephalus is a very serious complication This will be alluded to el ewhere

Soon after Horsley s drainage of the spinal canal (1890) Wynter (47) in 1891 inserted a needle between the vertebræ for drain age slightly antedating the introduction of Quincke s method of lumbar puncture and in another case he removed a lamina and drained the spinal fluid It is claimed that he ante dated Horsley also but Horsley s publica tion appeared a year earlier Parkin (32) in 1893 and Ballance (1) in 1897 each reported a drainage of the cisterna magna but without a resultant cure In 1923 Ballance (2) still advocated the same method though his re sults were not mentioned Haynes (21) in 1912 revived drainage of the cisterna magna devising an operative procedure much like one earlier advanced by Murphy (29) in

Six yea g I mo d b ll t from h oc pital l b f boy hours af h ac id A bral f gu pers ed f week f wa d d grad ally h infectio ached h la ral l m ingi d l p S phylococ w ec d from h p l fl id I h as I dra ed h rncl throu h th ld bull t ac Th pa ecovered l is ly d d tio f uch) h h tric f d ain g) d Alm t th d m g act (larg as th finge) had bee mad by th ourse f th b ll d th res lung fu gus from wh h th fectio rose (Fig)



F 7 D gram h g the po t f the t be d its lat t the t m m gn

1907 His 3 patients operated upon in the late stage of the disease died without more than transitory benefit Day (12) in 1913 *faithfully tried Haynes method in 12 cases* only one surviving Dench (13) in 1913 used the same operation on 3 patients without success

Probably more cures have been reported following spinal drainage than after any other surgical procedure possibly excepting lumbar puncture but the number even of these is quite small Macewen (8) is often credited with 6 cures in 12 cases of meningitis but in his cases the meningitis was focal and his operation restricted to the treatment of this focus However he looked upon drainage of the meninges through single or multiple laminectomies with irrigations as a possible hope if the pus is still fluid Rolleston and Allingham (36) in 1899 and Goebell (19) in 1909 each reported 1 cure and Barth (4) in 1914 3 cures after spinal drainage By the same method Leighton and Pringle (7) in 1915 report recovery of 2 cases of streptococcus meningitis following trauma and additional cases of streptococcal origin have just been reported by Rainey and Alford (35) in 1923

Attempts have also been made to drain the lateral pockets of the cisterna magna and of the pontine cisterna by a dural defect in the mastoid Such a fistula must be especially prone to secondary skin infections owing to the absence of soft tissues to protect and close the fistulous opening Jenkins (24) in 1922 and 1923 admits two mortalities from this cause Little can be said in favor of drainage from the parietal region though cures have been reported It opens only a small isolated area of the subarachnoid space and on only one side of the brain Cures have even been reported following decompressions surely a more irrational program could not be suggested One must not be misled by the optimistic reports of Jenkins most radical procedure He was dealing not with meningitis (for in none of his cases were organisms found in smears or grown on culture media) but with the well recognized sterile meningeal reactions to mastoid infections which will take care of themselves when the primary infection is properly treated

The above reports at least show a considerable number of cures Why there should be such a difference in the apparent results between drainage of the cisterna and of the lumbar spinal canal is difficult to understand There can hardly be any superiority of spinal over cisternal drainage if properly done If results from cisternal drainage do not equal those of lumbar drainage the conclusion is justified that the principle of drainage itself is useless That drainage will cure empyema etc is not proof that it will cure meningitis In one case there is a single space in the other a very complex circulatory system Even the results of draining empyema depend upon the nature of the infection For instance the results in streptococcus empyema especially in the early stages are such as to cast doubt upon the efficacy of the method

The difficulties of judging reports of cures following treatment are first that the death rate without intervention cannot be accurately estimated and second that the infecting organisms though generally grouped together differ greatly in their virulence (staphylococcus aureus albus streptococcus pneumococcus influenza bacillus etc) also because the pathogenicity of organisms even of the same species is exceedingly variable

Brun (5) reports an 80 per cent mortality from untreated meningitis following fractures of the skull This is the lowest mortality rate I have been able to find Preysing (34) in 1912 thinks there are more spontaneous recoveries from post traumatic than from

post otogenous meningitis an opinion which also seems to be borne out by the fact that most of the cures reported following drainage are from post traumatic cases So many different factors are involved in these two general types of infection (traumatic and otogenous) that one can only theorize on their relative importance The degree of fractures of the skull and the grade of infection in the sinuses at the time of the break in the bone vary tremendously A small crack in the floor of the skull when passing through a nasal sinus or mastoid and quickly closing over would obviously be a less dangerous portal of entry for organisms than a larger one which must remain patent for a longer time A fissure in an acutely infected sinus would be far more serious than one through a sinus without signs of infection and similarly an otogenous infection penetrating the meninges and constantly feeding the cerebrospinal fluid would probably offer more potential danger than a single infecton entering through a defect which closes quickly

Barr (3) in 1910 was able to collect only 50 cases of purulent meningitis cures following operation Eagleton (14) in 1921 only 30 cases Neal (30) in 1914 found only 5 cases of streptococcus meningitis which had recovered She also makes the statement that when Friedlander s bacillus is the infecting agent there is a much higher tendency to recover Singer (41) in 1924 reports a spontaneous cure of this rare form of meningitis Though many cases have been overlooked and many more not reported these figures at least emphasize the high mortality of the disease At best the mortality of all varieties of septic meningitis is excessively high It will surely run well over 90 per cent and in many forms will probably be over 95 per cent There is little evidence to support or disprove the general impression that on the whole strepto coccus infection is more fatal than staphylococ cus either of the aureus or albus type All appear about equally fatal Schlesinger (38) using a serum treatment reports the cure of a case of pneumococcus meningitis

The virulence of the organism is the most important factor in the differences seen in the clinical course and in the mortality rate Cases which fulminate are paralleled by those which run a longer and milder course even though the bacteriological findings are similar in each There is no better proof of this than the experiments of Felton and Wegeforth (15) who were unable to make any satis factory observations on any form of treat ment of experimental meningitis produced by streptococcus and staphylococcus because of the characteri tic variability in patho genicity of those organisms

EVIDENCE THAT DRAINAGE MAY OR MAY NOT BE EFFECTIVE

A priori one would reason that septic in fections of the meninges should be drained continuously as infections elsewhere and if possible treated by appropriate antiseptic solutions but the topography of the cere brospinal spaces offers serious difficulties to the former and the delicacy of the central nervous system has as yet precluded the latter And differences in the character of the infections themselves have a most im portant bearing on the success or failure of any form of treatment

It is unsafe to draw the conclusion that because purulent meningitis is a septic infec tion drainage is necessary or even helpful Analogy with the drainage of other infected cavities is untenable Not only the character of the infection but the anatomical features of the serous cavities must determine whether drainage is useful Drainage of a pleural cavity is simple because this is a single un divided pace Drainage of the peritoneal cavity is impossible because of the many pockets which form between the abdominal viscera and especially the intestinal loops And from the other angle drainage of pneu mococcus empyema is a neces ary life saving procedure but drainage of an acute strep tococcus empyema i of doubtful value The efficiency of drainage of any infection from any space is therefore an individual deter mination

The cerebrospinal fluid circulates in a closed system of spaces The *interior or en tricular part* of the system is concerned with the *forn ation* of cerebrospinal fluid the *ex terior or subarachnoid part* with the *absorp*

tion of the fluid Communication between the ventricular and subarachnoid divisions of this system is solely through three openings in the 4th ventricle—the paired foramina of Luschka and a mesial foramen of Magendie Closure of these foramina inevitably leads to dilata tion of the four ventricles from the pent up fluid which can no longer be absorbed (in more than minimal amounts) These open ings are therefore absolutely necessary to the circulation of cerebrospinal fluid to the integrity of the brain and to the life of the individual

The subarachnoid part of the cerebrospinal system in the shape and distribution of its component parts may roughly be compared to a tree The large cisternæ underlying the brain stem the interpeduncular and inter chiasmal regions of the brain and surround ing the spinal cord and the posterior aspect of the cerebellum form a single large trunk without restricting anatomical sub divisions From this trunk many branches radiate over all the cerebral and cerebellar surfaces forming a network of intercommuni cating channels and pools Over the cere brum these spaces conform more or less to the irregularly distributed interconvolutional spaces (sulci) It is from this point of the subarachnoid space cerebrospinal fluid is absorbed and from the standpoint of surgical therapy (drainage or irrigation) this is doubt less the weakest link because the channel are so interlaced and the communications so small Under normal conditions the entire system of cerebrospinal spaces both ventric ular and subarachnoid are in very free com munication This can be proven in two ways (1) a cubic centimeter of a harmless dye such as phenolsulphonephthalein injected into any part of a lateral ventricle will appear in the spinal fluid in less than 3 minutes and an inverse test (i e from the spinal canal to a lateral ventricle) demonstrates that the dye is transmitted with equal rapidity in this direc tion (2) if a cubic centimeter of India ink replaces an equal amount of cerebrospinal fluid in the ci terna magna (pressure remain ing unchanged) the ink granules will be freely distributed throughout the most distant branches of the subarachnoid space (over the cerebral hemispheres) in less than one hour Another proof of the very free communica tion between all the cerebrospinal spaces is the rapidity with which air injected into the spinal canal normally reaches all the cerebral sulci and cerebral ventricles (only a few seconds are required)

These experiments particularly the latter are also proof that drainage of the entire cere brospinal system is possible under normal conditions at least either from the cisterna magna or the spinal canal Under abnormal conditions of infection however the possibil ity of drainage of the entire cerebrospinal system will be dependent upon the chan,es induced by any particular infection The reaction of the meninges as evidenced both by the changes in the cerebrospinal fluid and in the meninges and even at times in the cerebral tissues varies so greatly with differ ent infections that the mechanical factors upon which drainage depends are far from similar For example pneumococcus infec tion quickly produces a very thick tenacious fibrinous exudate this is in marked contrast to the cloudy but still limpid fluid (at least in the earlier stages) of staphylococcus aureus and streptococcus infections It is hardly possible that a thick purulent exudate could even be drained from the larger cisternæ or the spinal canal and surely not from the finer radicles of the subarachnoid space—even in the very early stages of the infection For this reason *I have restricted the application of cisternal drainage to staphylococcus and strep tococcus infections in which the cerebrospinal fluid is not sufficiently altered in consistency to militate against drainage* However my experience with other infections of the meningeal spaces is not great enough to arbitrarily exclude them all from this form of treatment There may well be many in stances among this great group of infections where the fluid alterations are less intense and where drainage may be practical

THE OPERATIVE PROCEDURE

As emphasized before the operative pro-cedure differs only in detail from that of Haynes the principal difference being in the reliance upon tube drainage Our original

plan was to devise a method free from the danger of a secondary infection The difficulty—one sometimes thinks almost the impossibility—of maintaining the sterility of cerebrospinal fluid which is pouring over the skin is well recognized Only meticulous care can prevent and then only for a brief period a secondary infection from the skin organisms and such secondary invasions are almost surely fatal

A midline incision is made over the occiput The nuchal muscles are retracted exposing the occipital bone the atlas and the intervening atlanto occipital membrane (Fig 5) A circular area of occipital bone (about 2½ centimeters in diameter) is rongeured away including the posterior arch of the foramen magnum The exposed dura is then continuous with the occipito atlantal membrane The dura is opened at or near the midline and the incision carried upward to the margin of the bony defect and backward to the atlas The terminus of the occipital sinus if present is at first avoided and later ligated with a transfixion suture One or more lateral dural incisions are then made on each side in order that the opening may be ample and so protect against premature closure of the fistula The arachnoid covering the cisterna magna is then opened widely allowing the cerebrospinal fluid to escape Any slight bleeding from the dura is controlled by transfixion sutures The only danger of the procedure *per se* is postoperative bleeding into the unprotected cisterna magna A tiny ooze may escape detection or seem insignificant at the operation but there being no opposing tissue to act as a hæmostat and the dura being non contractile the bleeding may continue and be very serious Ballance reports the loss of a case from this cause The funnel end of a small catheter is sutured to both sides of the open dura with catgut ligatures (Fig 6) The mouth of the catheter is thus fixed to the dura and flush with it The tube is made wider than the dural slit at the points of fixation in order to insure against possible intrusion of the tube against the brain Additional insurance against such a possibility is obtained by suturing the tube to the trapezius muscle with catgut and to the skin with silk

Dural openings above and below the fixed mouth of the tube are purposely left open as a safety valve for the escape of cerebrospinal fluid if the tube should become clogged The trapezius muscles are only partially brought together in order that fluid may also collect between them if the tube should not take care of the drainage A second opening in the side of the tube is intended to afford exit for any such pocket of fluid And finally the skin is only loosely closed around the tube as an additional safety vent for any possible collection of fluid which might form around the tube and not be able to escape through the lateral aperture (Fig 7)

Drainage through the tube has been remarkably effective secondary drainage around the tube into the dressing has only occurred once and for a very brief period On withdrawal of the tube after several days (4 to 7) discharge of fluid into the dressings persists interruptedly for only 1 or 2 days It is only during this time that we are fearful of a secondary infection The strong deep muscles of the neck are the greatest insurance against a continuation of a discharging sinus—a protection which is entirely lacking when lateral drainage of the cisterna is employed In no instance has there been any noticeable effect from the continuous loss of cerebrospinal fluid

REPORT OF 4 CASES OF STREPTOCOCCUS AND STAPHYLOCOCCUS MENINGITIS TREATED BY CISTERNAL DRAINAGE 3 CURES 1 DEATH

These patients have been treated by continuous drainage of the cisterna magna the operative procedure differing only in detail from that of Haynes (21) In 1 patient the infection followed a fracture of the skull (streptococcus hæmolyticus) another followed lumbar puncture (staphylococcus aureus) Two were postoperative infections (1 streptococcus hæmolyticus and 1 streptococcus viridans) which developed after removal of cerebellopontine tumors Three of these 4 patients recovered and 1 (streptococcus hæmolyticus) died The cases are briefly summarized as follows

CASE 1 A boy of 6 years was struck by an automobile He was unconscious on arrival at the hos

pital and bled from the nose and left ear Some cerebrospinal fluid drained from the nose Within a few hours the patient became quite conscious The day following the accident his temperature rose to 104 5 degrees F and the pulse to 160 (Fig 3) His neck was rigid Kernig's sign was positive He was very drowsy but irritable white blood cells 27 000 The fluid from lumbar puncture was cloudy smears showed micrococci which on culture proved to be streptococcus hæmolyticus On the following day his temperature rose to 106 degrees pulse to 180 and he became very irrational Sixty hours after injury and 36 hours after the first signs of meningitis the cisterna magna was drained by a small rubber tube (Fig 3) Fluids were forced by mouth

The drainage tube was removed on the seventh day but drainage continued through the tract 2 days longer No change in his temperature followed immediately nor for 4 days after drainage was begun However his general condition was at once appreciably improved the principal change being that he was a little more alert and less drowsy The temperature returned to normal on the eleventh day (9 days after operation) There were slight rises for several days thereafter The drainage averaged about 100 cubic centimeters per day for the first 3 days gradually diminishing thereafter His recovery was then uneventful Six months later he was perfectly well

CASE 2 A boy of 11 years developed meningitis following lumbar puncture Five days later the cerebrospinal fluid was cloudy and contained 1 550 cells per cubic centimeter staphylococcus aureus gre on culture media His neck was rigid there was opisthotonos he was very drowsy and irritable

Operation Continuous drainage of the cisterna magna was begun 5 days after the first sign of meningitis (Fig 4) Fluids by mouth were forced The drainage measured 350 cubic centimeters 225 cubic centimeters 205 cubic centimeters on 3 successive days after the operation The tube was removed after 5 days Intermittent drainage through the sinus tract persisted 2 days longer The patient's temperature and general condition did not change immediately or for several days following drainage The temperature returned to normal 14 days after operation and did not again become elevated Recovery followed and 5 months later he had no residual signs or symptoms

CASE 3 Mrs K age 36 18 hours after the partial removal of a cerebellopontine tumor was suddenly seized with a severe chill The temperature quickly rose from the postoperative level of 101 degrees to 105 4 and the pulse from 120 to 170 The cisterna magna was reopened 36 hours after operation and purulent fluid escaped Streptococcus hæmolyticus grew from the culture The patient died 24 hours later o about 60 hours after the operation It should be noted that the immediate postoperative course was entirely uneventful she was soon conscious and just before the chill was considered well out of danger Drainage had no appreciable effect on the temperature or the condition of the patient

CASE 4 Mrs W age 49 was operated upon 24 hours after the preceding patient (Case 3) A typical cerebellopontine tumor was totally extirpated A streptococcus viridans infection followed Unlike the preceding case there was no sudden onset of symptoms of meningitis Her temperature failed to return to normal and on the eighth day after operation began to rise from a general level of 100 to 101 degrees to a little higher level each succeeding day reaching 104 degrees on the fifteenth day Although she was drowsy and at times irrational her general strength was better than her temperature would indicate The pulse ranged between 100 and 110

Ventricular puncture The fluid was cloudy and contained 1 840 cells streptococcus viridans grew from the culture Drainage of the cisterna was withheld until the eighteenth day and was continued for 4 days Following removal of the tube fluid was aspirated from the lateral ventricles the spinal canal or the cerebellar cistern by punctures once or twice daily Her temperature remained elevated 43 days after the onset of drainage and 61 days after the operation very gradually returning to normal Though there was no immediate temperature response a decided improvement in her general condition came immediately after drainage was begun she was at once much less drowsy In this case the drowsiness was undoubtedly largely a pressure phenomenon The degree of intracranial pressure could always be easily determined in her case by the fulness and tightness of the cerebellar decompression The decompression was therefore used as an indicator for the many aspirations which were necessary and after each of these aspirations a decided improvement in her condition followed Continuous drainage was stopped earlier than in the other cases because of the fear of a secondary infection through the shallower sinus tract and because tapping was found to satisfactorily control pressure symptoms in this relatively chronic type of infection She has now been perfectly well over 4 months She has no headache or other symptoms the decompression is soft and retracted About 35 aspirations (from the locations mentioned) were made after cisternal drainage was stopped gradually the intervals between punctures was lengthened until their discontinuance on the seventy seventh day after operation The rescue of this patient is due to the careful vigilant and unremitting care of my assistant Dr Fisher

INTERPRETATION OF RESULTS

Our results are greatly at variance with those of Haynes Day Dench and others who have used much the same method and have found no appreciable reduction in the mortality rate as compared with nature course Difference in the operative procedures could

not be responsible But it would be unfair to draw generalized conclusions without a more careful analysis Though all cases of meningitis are extremely ill and carry an exceedingly high mortality the variations in severity are striking Doubtless their cases were much graver than mine In all of their patients the meningitis was of otogenous origin and while statistics are too meagre to draw upon this form of meningitis (for the moment excluding the kind of organism) is probably more severe than that following trauma or the accidental inoculation of the cerebrospinal fluid Patients with meningitis of otogenous origin must combat two big infections one local in the mastoid the other in the meninges and the primary infection must appreciably reduce the patient s vitality to combat the secondary meningitis Moreover in post otogenous meningitis there are more intracranial complications such as cerebral abscess and sinus thrombosis any of which would make the patient s recovery extremely unlikely regardless of any effective treatment of the meningitis These operators have also indiscriminately used drainage in all cases of meningitis without considering the type of organism Thus 4 of their 9 cases were pneumococcus meningitis a form in which the exudate is so thick and fibrinous that drainage would probably be without any beneficial effect whatever Our cases have all been accidental infections of the meninges without other complications except that in 2 cases big intracranial operations for the removal of tumors preceded the infection All have been streptococcus and staphylococcus infections in which the character of the fluid is such as to make drainage feasible and in the results it is to be understood that only these meningeal infections are considered It may well be open to objection that all of these patients might have made a spontaneous recovery had they been left alone In favor of such an assumption is the fact that there is no change in temperature or leucocyte count[1] and only a slight change in the general condition of the patient In 2 patients we felt there was a little less drowsiness and less complaint of headache though they were probably just as irritable and irrational as before drainage It is only on the basis of the ultimate results that I am able at all to combat the assumption of possible spontaneous cures While the statistics of the literature indicate an exceedingly high mortality probably over 95 per cent my series is far too small to consider statistically it is entirely possible we may have had a very fortunate group of cases Case 4 the long drawn out viridans infection is an exception to the statement that no great change in the general condition followed There is no doubt that the patient was maintained in a conscious and semi conscious state by the withdrawal of fluid for this pressure phase of the disease could always be directly observed by the size and tension of the decompression Such a change would be less likely to be appreciated in the more acutely ill patients where pressure manifestations probably play a less conspicuous rôle

At best it is evident that the procedure does not offer a panacea even for cases of streptococcus and staphylococcus meningitis The single death is evidence of this The overwhelming character of this infection is shown by the severe chill and its rapid appearance (18 hours) after the operation Each case of septic meningitis is a law unto itself the factors being the kind of organism the virulence of the organism the resistance of the patient the concomitant complications and also the manner of entrance of the infection

Granted that drainage of the cerebrospinal system is possible what will it accomplish? It has been shown from the temperature charts that no temperature reduction follows at once nor for days afterward also that the patient s general condition is not markedly though probably slightly improved immediately after drainage Meningitis produces two kinds of symptoms those due (1) to toxæmia and (2) to pressure There can be no doubt that in every case of meningitis both factors play a rôle though the relative degree of each is variable for different infections and probably also for different stages in the same illness In all the acute streptococcus aureus and staphylococcus hæmolyticus infections

[1] Case the leucocyt between 7,000 and 5,000 of th tempera re 7 000 befor re 10 and varied t y d y grad lly f ll g with th

the overwhelming factor is the toxæmia and the smaller but very important factor is pressure The reason for this conclusion is that the irritability delirium fever leucocytosis and tachycardia are not influenced by the sudden pressure relief

It is well recognized that cerebrospinal fluid absorbs very quickly from the subarachnoid space Over 40 per cent of phenolsulphonephthalein injected into the spinal canal will normally be excreted in 2 hours and its first appearance in the urine will be in less than 2 minutes (9) To this rapid absorption is due the overwhelming systemic effect of the meningeal infection And doubtless also much of the defense of the meninges is due to rapid transfer of much of the infection from the subarachnoid space into the venous circulation

But the actual amount of cerebrospinal fluid and its pressure are markedly increased In the slower streptococcus viridans infection (Case 4) the pressure element was much greater in fact it was without question all important to the patient s tenure of life The importance of the element of pressure can al o be understood from two recent experimental efforts on 2 comatose patients In 1 the condition was due to tuberculous meningitis in the other to a prolonged refractory meningococcus meningitis (eighth week) Each quickly became entirely conscious again later succumbing to the disease (5 and 12 days respectively) In neither case was the temperature lowered

Intracranial pressure in meningitis is of twofold origin In the acute stages of the disease the fluid surely is an overproduction arising from inflammation of the meninges Later the increased fluid is due also to occlusions which develop in different parts of the subarachnoid space (1) in the foramina of Luschka and Magendie (2) in the cisternæ beneath the brain stem and (3) in the subarachnoid spaces over the cerebral hemispheres Hydrocephalus inevitably follows any of these occlusions Roentgenological and pathological proof of these variously situated obstructions have been shown in previous reports by the author (6) In the natural course of events in the process of healing these obstructions may absorb and lead to spontaneous reopening of the cerebrospinal spaces or cicatrize and lead to chronic progressive hydrocephalus It often develops in tuberculous meningitis and in other obscure forms Recently I reported a case in which hydrocephalus followed a meningeal complication of measles (7) But consideration of hydrocephalus following the healing of meningitis is not within the scope of this paper Doubtless the overwhelming proportion of its incidence is in the wake of meningococcus meningitis The reason for this statement is that this is the only type of meningitis which heals spontaneously in sufficient numbers to account for this common form of hydrocephalus and also that we have so frequently observed this complication in meningococcus meningitis But hydrocephalus is also a problem of acute and subacute meningitis In the case of meningococcus meningiti mentioned above as treated by cisternal drainage the foramina of Luschka and Magendie were occluded and a ventricular empyema followed With such a complication drainage of the cisterna magna or of any part of the subarachnoid space can of course bring no permanent relief Nor does it seem probable that any form of surgical treatment will be effective It is easy enough to reopen a foramen of Magendie but the persisting infection will almost certainly close the opening again Drainage of the ventricles from any other point to the exterior is only temporizing for no cure can result until drainage of the ventricular fluid into the subarachnoid space is established

Whether hydrocephalus is ever a complication of staphylococcus or streptococcus meningitis I do not know I have hoped that if continuous drainage of the cisterna aided in the cure of these forms of meningitis it might be equally effective in *preventing* this complication In Case 4 the possibility of obstruction at the base was always feared but did not develop In all cases operated upon we have added a perforation of the skull in the occipital region of each side so that the lateral ventricles can be tapped at any time This precaution adds only a few seconds at the time of operation and makes it possible

to tap a ventricle (as in Case 4) for the temporary relief of pressure but more important it allows us to always know at any time if the foraminæ of Luschka and Magendie are patent *Registration of the ventricular pressure* alone should give this information but if any doubt exists the harmless indigocarmin test (8) will eliminate all doubt

It may be asked wherein lies the advantage of cisternal drainage over lumbar drainage If continuous drainage could be equally well maintained by lumbar drainage the effects should be the same The only superiorities of cisternal drainage should be that continuous drainage is actually easier to maintain and that the drainage tract is easier to close when desirable The cerebellum remains at a distance of to 3 centimeters from the opening of the drainage tube and cannot plug it (at a later stage a foraminal hernia of cerebellum might develop either from hydrocephalus or infection in the cerebellum) whereas the roots of the cauda equina are prone to float into and block the opening of a tube in the spinal canal should the tube be inserted into the spinal dura instead of being sutured flush with it this possibility would be even more likely It is much more difficult to maintain a drainage tube in the lumbar region and the chances of soiling the wound from excreta are always great It is relatively simple to immobilize a drainage tube in the hollow of the neck by a big dressing Either the tube can be attached to a bottle or if the patient is too restless the drainage bottle can be inserted into the dressing and lateral movements of the body need not be restricted Anteroposterior movements are prevented by a check rein from the forehead to the interscapular region Moreover it is relatively easy to maintain sterility of the skin in the suboccipital region

In cases of meningitis following a mastoid infection I should feel even more strongly that this type of cisternal drainage should be used instead of lateral drainage of the cisterna through a mastoid operative wound as has been suggested and tried Lateral drainage would be much more difficult to maintain uninterruptedly because the cerebellar lobe lies against the dura and drainage through an infected mastoid would surely soon introduce an additional secondary infection of other organisms Moreover the patency of a lateral fistula would be a matter of chance instead of control It need not of course be urged that a primary mastoid infection which is feeding the meninges should receive the earliest possible treatment independent of cisternal drainage

It should be emphasized that drainage alone cannot cure meningitis In the final analysis the body must be able to combat the infection and if this is impossible drainage will be unavailing Drainage can only help nature fight this battle by removing the intracranial pressure and by eliminating much of the infection It is therefore not to be expected that any method is going to do more than reduce the high mortality rate which exists at the present time

CONCLUSIONS

1 Early continuous drainage of the cisterna magna is advocated for the treatment of meningitis in which the infecting organism is staphylococcus and streptococcus

2 Three of 4 cases so treated survived 1 case of streptococcus viridans 1 of streptococcus hæmolyticus and 1 of staphylococcus aureus In the unsuccessful case the organism was streptococcus hæmolyticus

3 This method is not urged in other forms of meningitis because it is felt though not proven that the character of the inflammatory exudate would probably make drainage impossible

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FIVE YEAR END-RESULTS OBTAINED IN CARCINOMA OF THE FEMALE PELVIC ORGANS WITH SPECIAL REFERENCE TO RADIUM AND X-RAY THERAPY[1]

By HENRY SCHMITZ M D F A C S Chicago

FROM 1914 to 1923 inclusive 734 carcinomata of the female pelvic organs entered my clinic The primary carcinomata numbered 584 and the recurrent carcinomata 150 The recurrences followed a preceding surgical excision of the cancer All of the 734 cases were subjected to treatment with radium and X rays Since 243 cases have passed the conventional five year period it was deemed of interest to determine the curative value of radiation therapy in carcinomata of the female pelvic organs If we apply the same rules to the cases treated with radiations as we do to those treated with surgery the relative and absolute curabilities also can be determined for the radiation method of treatment It was thought advisable to consider the primary and recurrent carcinomata separately

THE PRIMARY CARCINOMATA

Table I shows the number of primary cases treated during each year and for the different regions In the last column are given the percentages for each organ in this series

To determine the method of treatment the cases were grouped *In Group I* were placed the carcinomata in which the cancer after a physical examination was found to be clearly localized without any evidence of either a second growth an œdematous condition of the tissues immediately surrounding the tumor an infiltration of the surrounding tissues a fixation of the growth or an invasion of the regional lymphnodes A diagnosis of malignancy in this group can only be made with the microscope The clinical evidence usually points to a benign disease Group II comprises the cases in which doubt existed about the definite localization of the growth after a physical examination An œdematous or doughy consistency of the paracervical tissues is felt on bimanual examination Group III contains the cases with evidence of invasion of the surrounding tissues organs and regional lymphnodes The tumor is definitely fixed In Group IV those carcinomata were placed which had large necrotic ulcers or craters had widely invaded surrounding tissue and organs or had advanced cachexia from auto intoxication A careful general physical examination was made in each case and X ray pictures were taken in all advanced cases to determine bone metastases

The indications for treatment were in Group I radical surgical excision in Group II radium and X ray and later on excision in Group III radium and X rays and in Group IV palliative medicinal treatment

Patients with Group I or Group II cancers who had a complicating disease contraindicating surgical intervention were treated with radiations only Exceptions to the general rules were made in cervical carcinomata If the latter had been treated with radium and X rays we did not subject them to a subsequent operation The reasons were twofold (1) We can apply to no other organ in the entire pelvis such large amounts of radium The uterus is thereby entirely destroyed A hard fibrous atrophic uterus is all that remains after healing is completed following the radium destruction (2) We must assume that the subsequent function of a cancerous organ locally healed from carcinoma by the rays will again cause irritation Recurrences are frequent if not the rule The uterus is practically removed totally by the effect of the rays It ceases to function Total abstinence from coitus can be ordered and is usually maintained The condition resulting from radiation therapy may be likened to a radiation panhysterectomy The removal of such an apparently harmless uterus often lights up carcinoma A subsequent operation after a local healing of a cervical carcinoma is therefore not indicated and unnecessary

In carcinomata of the other pelvic organs

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radium must be applied in much smaller doses if we wish to avoid irreparable destruction The result is a local degeneration of the carcinoma and not a destruction The cancer cells are rendered dormant for an indefinite time Local irritation or inflammation however may cause them to reassume activity Therefore if we wish to avoid recurrence or bring about an absolute cure we must shut out the organ from subsequent function and irritation A colostomy enables one to exclude the rectum However in the other regions we must resort to surgical eradication if we wish to assure healing

We have discarded the grouping into operable borderline inoperable and advanced hopeless cases The determination of operability or inoperability depends entirely on the subjective interpretation of the clinician One needs only to study the various interpretations of the different clinicians on operability to prove this contention For instance Baisch extends operability of cervical carcinomata to cases with a positive invasion of one of the parametria Obviously if we intend to compare the efficacy of the methods of treatment for carcinoma we must use a grouping which enables every one to give the same interpretation of the extent of the cancer disease

From 1914 to 1918 inclusive 180 primary carcinomata were treated according to grouping and indications given in Table II The exceptions have been stated in a previous paragraph The cases of Group I had complicating diseases as advanced Bright's disease diabetes mellitus discompensated heart disease and so forth hence were treated with radium and X rays only Therefore they are enumerated in Table III under Group I The number of cases living were free of the disease that is were anatomically healed and subjectively well at the expiration of five years from the time of treatment The clinical diagnosis was always corroborated by microscopic examination of excised tumor tissue

Since the cervical carcinomata comprise the greater number of all the carcinomata we have made a more detailed study of them Table IV shows the arrangement in groups and years

In order to evaluate the results given in this table I have collected the results obtained in other clinics (See Table V) From this table we may conclude that the five year end results or absolute cures in the last three clinics with the combined radium and X ray treatment are practically the same On the other hand the results of the other clinics using radium exclusively show marked discrepancies This may be explained by the radical method of treatment with radium used by Kehrer who considers doses of 10 to 14 000 milligram element hours as the *Einschmelzungs dosis* while Clark Bailey and Healy employ from 3 000 to 5 000 milligram element hours of radium on the average In the combined method of radium and X ray therapy a 100 per cent erythema dose of X rays is added to the radium dose which is from 3 600 to 4 800 milligram element hours

If we compare the results of Table V with those obtained with surgical methods and take into consideration the operability percentage then it is seen that the operability percentage in the clinics of Clark Baily and Healy Schmitz and Doederlein is very low It is high in all the others However high operability means an early and prognostically favorable cancer material Obviously the clinics using radiation therapy have received a large number of advanced carcinomata Hence the absolute curability percentage is low The high relative curability percentage in my clinic probably resulted from the method of grouping This however does not influence the end results (See Table VI)

The observations which we have made on the efficacy of surgery and radiation are

1 Surgery is the method of choice in the Group I cases Poor surgical risks are treated with the combined radium and X ray method of treatment

2 If surgical treatment is used in the Group II cases it should be preceded by the application of radium and X rays to render the cancer harmless and thereby increase the efficacy of the treatment However radiation therapy without subsequent surgery gives better permanent results in cervical carcinomata

3 Radium and X ray therapy is the method of choice in the clearly inoperable cases

TABLE I THE PRIMARY CARCINOMATA OF THE FEMALE PELVIC ORGANS

	9 4	9 5	9 6	19 7	9 8	9 9	9	9	9	9 3	T t l	F C t
V lva											7	
Ureth			3								6	
V gina							t		4			6
Bl dd					8	7		6	7	4		6 8 5
Rect m	4	6	6	4	3	6	9	3	8	4	3	7 6 5
Cervi	9	9	6	8	33	3		3	6 4	6	34 8	59 6
C rp	3						3	6		5	7	6
O y					3	3	3			7		7
T t l	8		7	38	6	5	6 4	8	5	7	9	

TABLE II GROUPING AND INDICATIONS FOR TREATMENT OF PRIMARY CARCINOMATA OF THE FEMALE PELVIC ORGANS

G p	Phy l F ndings	T tm t
I	Th lea ly luc l d gl gr wth b	R d l gic l is
II	S prcio f b gr ing f t d g b gr th	Rad m d X y d bseq t dic l g l
III	M lt l gr th fil t f djac es fi u f g l m t f gio l lymph des	P d m d X ray
IV	E t l t d ec d d h ia l em d t t m ta	I ll tu l ymp m tm t

TABLE III FIVE YEAR END RESULTS IN PRIMARY CARCINOMATA OF THE FEMALE PELVIC ORGANS

G p	I		II		III		IV		T l	
	N	L ving	N	L ing	N	L ing	N	L g	N	L i g
V l										
U thra									5	
V gi										
V					3		5			
Rect m			5			3			3	5
C rvi	3	3	5	6	6	6	5		1	5
C p									7	
Ova y					5				8	
T t l			5	6	96		7		8	7
P C t	8 5		6							

N mbe y l g y pe t 6

Sixty out of a total of one thou and clearly inoperable and advanced cases were anatom ically healed and subjectively well at the end of 5 years If we exclude the hopeless and advanced cases of Goup IV then the percent age would be 7 4

4 It is useless to treat the Group IV cases with massive doses of radiation with the in tention of producing healing Such cases hould be treated symptomatically to arrest bleeding discharge and pain

THE RECURRENT CARCINOMATA

The recurrent carcinomata treated between 1914 to 1923 inclusive are arranged in Table VII according to year and location The re

TABLE IV FIVE YEAR RESULTS IN CERVICAL CARCINOMATA

A Primary Carcinomata

Year	Group I			Group II			Group III			Group IV			Total		
	No.	Living	Per Cent.	No.	Living	Per Cent.	No.	Living	Per Cent.	No.	Living	Per Cent.	No.	Living	Per Cent.
1904							4			3					
1905				4	3					5			9	3	53
1906							8			5			6	3	57
1907				4										4	87
1908				4			5			8			3	4	9
Total				5	6		6	6		5			3	5	5

B Recurrent Carcinomata

1905							3			4			8		
1906							6			3					
1907							3						7		
1908							6			5					
Total	4			4						6			8		

TABLE V COLLECTIVE STATISTICS OF FIVE YEAR CURES OF CERVICAL CARCINOMATA TREATED WITH RADIUM AND RADIUM AND X RAYS

Clinic	No.	Group I			Group II			Group III			Group IV			Total			Method of Treatment
		No.	Living	Per Cent.	No.	Living	Per Cent.	No.	Living	Per Cent.	No.	Living	Per Cent.	No.	Living	Per Cent.	
Clark J. G. Brady Hospital	8				6						8	6	5			8 6	Radium
	97				6	6						8	7	55	7		Radium
Kelly E.	95 97	5		7			3				7		7 3	9	36	7 8	Radium
Doederlein	99 8			8	3			3	6 7	69			65	755	3	3	Radium and X ray
Bumm	97	6	8		6	5		4			7			98	8	4	Radium and X rays
Schmitt H.	998	3	3		5	6		6	6		5			3	5	4	Radium and X ray

Total Number Group I and II Radium alone 5 3 5 per cent
Total Number Groups III and IV Radium alone 116 66 per cent
Total Number All Groups Radium alone 227 per cent
Total Number Groups I and II Radium and X rays 93 38 per cent
Total Number Groups III and IV Radium and X rays 305 36 per cent

TABLE VI PERCENTAGES OF OPERABILITY AND RELATIVE AND ABSOLUTE CURABILITY OF CERVICAL CARCINOMATA FOR DIFFERENT METHODS OF TREATMENT

Clinic	Operable Per Cent.	Total Number	Number Cured	Relative Cures	Absolute Cures	Method of Treatment
Clark J. G.	7				8 6	Radium
Brady Hospital		55	7	6		Radium
Kelly	57		6	7	7 8	Radium
Doederlein	6	55	3	3		Radium and X Ray
Bumm		9	8	3 8		Radium and X Ray
Schmitt	75		5	5	6	Radium and X Rays
Johns Hopkins	5	87		6 5	6 6	Surgery
Goeckel		5	3		6	Surgery
Crossen	6	8			8 5	Surgery

Cases treated exclusively by radium included

currences occurred after a preceding surgical removal either radical or incomplete The patients usually waited a long time before application for treatment The presenting symptom was almost invariably a repetition of the symptom of the primary carcinoma The delay in an earlier request for treatment was explained by the fact that the patient thought herself to be cured

For the study of the efficacy of treatment the recurrent carcinomata were also grouped (See Table VIII)

TABLE VII RECURRENT CARCINOMATA OF THE FEMALE PELVIC ORGANS

	0 4	9 5	9 6	9 7	9 8	9 9	9	9	9	9 3	T t l	P C t
V l						3					8	5 3
V gin												7
U thra												7
Ves									8		5	
Rect m											9	6
C rvix	8			7		4	3	8		9	4	60 3
C p											3	
O y											9	6
T t l		3		8	6					5	5	

TABLE VIII GROUPING AND INDICATIONS FOR TREATMENT OF RECURRENT CARCINOMATA OF THE FEMALE PELVIC ORGANS

G p	Phy l F d g	T tm t
I	Loc l m bl ec	R d m d X ray d xcis on
II	Rec rr i djac t t g f ly m bl	R d m d X y E If pr t bl
III	Loc l djac t ec rr w h firm fi	R dl m d X y
IV	Rec h t w d l ment d d h d t t m t ta	Palli t d ympt m tm t

The 5 year end results of the recurrent cervical carcinomata are given in Table IV It is seen that Groups III and IV comprise 40 of the 48 cases This proves the delay in applying for radiation treatment the operability being 16 7 per cent The total number of recurrent carcinomata from 1914 to 1918 inclusive is 63 with 5 five year cures that is 7 9 per cent One was a rectal carcinoma and four were cervical carcinomata Group I numbered 4 cases Group II 4 Group III 33 and Group IV 22 The possible operability would be 12 6 per cent

Therefore we may consider the results of radiation treatment of recurrent carcinomata in our series negligible—undoubtedly due to the great number of Groups III and IV cases This observation does not agree with that made in recurrent mammary carcinomata for the same period The total number was 60 9 belonged to Group I with 6 five year cures or 66 7 per cent 9 to Group II with 3 five year cures or 33 3 per cent 23 to Group III with 2 five year cures or 8 7 per cent and 19 in Group IV with no cures The operable cases of Groups I and II numbered 18 with 9 five year cures or 50 per cent The operability percentage is 30 1 In the total number of 60 we had 11 five year cures or an absolute curability of 18 3 per cent We may state that in the same period 31 primary breast carcinomata were treated with 9 five year cures that is an absolute curability of 29 per cent

It seems to be advisable to examine the tissues and organs removed surgically by careful macroscopic and microscopic examinations If the periphery of the removed tissue mass is not at least 3 centimeters distant from the carcinoma area the patient should be immediately subjected to radiation treatment It is a surgical principle in the operations for removal of carcinomata to make the incision 3 centimeters distant from the periphery of the growth We must apply the same rule to carcinomata of the female organs If we cannot make the incision in healthy tissues operative treatment is evidently incomplete and useless

SUMMARY

The five year end results of radiation treatment of primary carcinomata of the female

pelvic organs have been given The absolute curability in a series of 180 cases is 15 per cent the relative curability in 37 cases of Groups I and II is 46 0 per cent

Similar statistics for cervical carcinomata from other clinics have been added The radiation treatment of carcinomata of the female pelvic organs compares favorably with the surgical treatment if the percentages of cases suitable or not for operation are taken into account

The grouping of carcinoma cases should be based on the results of the physical examination and not on the subjective interpretation of operability or inoperability

The radiation treatment of recurrent carcinomata of the female pelvic organs has given only temporary subjective palliation evidently due to the delay in applying for treatment soon after the operation It is suggested that patients who have had incomplete surgical operations be subjected immediately after operation to radiation treatment We may then succeed in improving the results of radiation treatment in this class of cases as shown in recurrent mammary cancers

MALIGNANT EPITHELIAL TUMORS OF THI THYROID

With Special Reference to Invasion of Blood Vessels

By ALLEN GRAHAM M D F A C S Cleveland Ohio
F m th D partm t f S g ry d f P th l gy Lak d H p t l d S hool f M d W t Res U rs ty Cl l d Oh

NO attempt will be made to summarize the voluminous confusing literature concerning epithelial tumors of the thyroid In 1921 Wilson[1] reviewed the literature and gave a complete list of references to articles that have appeared since the review by Mueller and Speese (1906) and some references not included by the latter authors In reporting his experience with these tumors at the Mayo Clinic Wilson states Correct early diagnoses of malignant tumors of the thyroid are made probably less frequently than of malignant tumors involving any other organ of the body In 1922 Meleney reported A Metastasizing Malignant Tumor of the Thyroid referred to the literature and drew this inevitable conclusion At present the diagnosis of malignant tumors of the thyroid is very difficult and until more data are supplied the criteria of malignancy will be hard to find Until that time the most accurate diagnoses will be made by the pathologist of greatest experience who has been able to check up his pathological observation with exact clinical follow up data Almost all authors emphasize the difficulties in diagnosis and no two agree on a satisfactory classification

It is in connection with epithelial tumors that the greatest confusion and difference of opinion concerning the nature the pathological diagnosis and an appropriate terminology exist This we believe may be attributed to the following

1 The failure in the past to discriminate sufficiently between normal and adenomatous thyroid tissue

2 The none too well appreciated importance of the role of the pre existing adenoma in furnishing the starting point for a very high percentage of epithelial malignancies

3 The great number and combinations of names implying different pathological entities applied by various authors to what in the vast majority of cases is clearly one and the same fundamental pathological process

4 The academically irreconcilable conflict between a purely morphological and a biological interpretation of the term carcinoma

5 The failure to take sufficiently into account the peculiarities of the thyroid as a tissue or special organ in arriving at what constitutes malignancy

Our personal experience with malignant epithelial tumors of the thyroid and the conclusions drawn from a recent intensive study prompted by the uncertainty of pathological diagnosis in a number of cases and the failure to find a satisfactory solution in the literature seems to offer a basis for some simple practical suggestions that may be of interest Certainly the present conceptions are immeasurably more satisfactory than any we have previously entertained

In order to avoid misunderstanding it is necessary to state exactly what we mean by the following

Carcinoma is intended to include all epithelial tumors that show any clinical or pathological evidence of malignancy

Malignant adenoma is applied to any tumor that is or was an adenoma and has become malignant

Malignancy is evidenced by one or more of the following local invasion recurrence (of the original tumor) after incomplete excision metastasis death of the patient due to the invasive character of the tumor

With the above definitions in mind this article is offered as a preliminary report of our observations on malignant tumors of the thyroid The present discussion is limited to tumors arising from thyroid epithelium and excludes parastruma struma postbranchialis and squamous cell epithelioma or carcinoma Three cases of so called mixed

1 Wilson L B Ann Surg 1921 lxxiv 9
2 Meleney F L Ann Surg 1922 lxxv 68

tumor or carcinoma sarcoma are also ex cluded although their inclusion as carcino mata would strengthen rather than detract from our main conclusions The chief object is to consider some special features of thy roid epithelial tumors and to call particular attention to a hitherto not sufficiently recog nized nor utilized evidence or criterion of malignancy *Much detail has been omitted* This deficiency will be supplied in a series of subsequent articles

The report is based on the material avail able at Lakeside Hospital from 1905 to 1922 inclusive and a few tumors received from other sources The total experience with ma lignant tumors is mentioned for the purpose of showing the relative incidence of the various types of lesions and the relation of the epithe lial tumors to the total number of malignan cies The incidence of malignancy based on thyroid pecimens received in the laboratory (1915 to 1922) from the surgical division of Lakeside Hospital only varies between 1 and per cent The total list includes the records of 134 patients in 12 of which a clinical diag nosis of malignancy was made but tissue was not examined Of 1 tumors examined path ologically there are 1 parastruma 10 sar comata 3 tumors at present classed as car cinoma sarcoma and 108 epithelial tumors either malignant or suspicious Only the lat ter group will be considered at this time

The 108 epithelial tumors fall readily into four distinct groups on the basis of their gross and microscopic anatomy (Table I) It is to be noted that all of these tumors formerly have been diagnosed and considered by our selves and others as malignant and have been designated and classified by the use of such terms as carcinoma malignant adenoma ade noma with early malignancy and such quali fying terms as doubtful early su picious pre cancerous etc The use of these terms was the reflection of an uncertainty in our pathological diagnosis altogether too common to be satis factory to ourselves or to the surgeon There were too many instances in which we were un able to say with reasonable reliability whether the tumor removed was malignant or benign This condition prevailed chiefly in connec tion with one type of lesion—adenoma In conformity with the data now available 43 tumors have been excluded from the list of 108 previously considered malignant

The two scirrhous and the eight papilliferou adenocarcinomata are distinct types grossly and microscopically They are exactly com parable to similar lesions in other tissues and organs and present no problem peculiar to the thyroid except that six of the papilli ferous adenocarcinomata originated in ade nomata In the other two papilliferous and the two scirrhous we can neither prove nor disprove adenomatous origin although the thyroid was adenomatous in each case The six papilliferous adenocarcinomata that orig nated in adenomata are not included in the 55 malignant adenomata because this type of lesion as well as the scirrhus are essentially single type tumors and do not invade the blood vessels so far as our experience goes Malignant adenoma on the other hand is usually a multiple type tumor and invari ably invades the blood vessels

Concerning papilliferous adenocarcinoma it is necessary to state that a distinction is made between those tumors which grossly and microscopically are made up almost if not entirely of papillomatous tissue usually in connection with a cyst and those solid adenomata which among various other his tological pictures present localized areas of papilliferous growth by no means predomi nant The former only are designated pa pilliferous adenocarcinomata and are primary lymphatic invaders the latter are designat ed malignant adenomata and are primary blood vessel invaders It is important to preserve the distinction

Scirrhous and papilliferous adenocarcino mata will be omitted from further discussion in the present article since their diagnosis classification and the determination of ma lignancy rests on the usual pathological stand ards

In the 55 carcinomata (designated malig nant adenoma) and the 43 adenomata form erly considered malignant but now classed as benign will be found the key to the solution of the problem of thyroid epithelial malig nancy A study of these cases leaves little room for doubt that we are dealing with va

rious stages of one pathological process namely the transformation of benign to malignant adenoma and the only question is what constitutes malignancy? Where and how shall the line be drawn between these two groups of tumors? These questions bring us to a somewhat detailed consideration of some of the most important features of these lesions

MORPHOLOGY OF CELLS AND TISSUE AS EVIDENCE OF MALIGNANCY

In the series of 98 tumors under discussion we find all conceivable steps stages and degrees in the growth differentiation and degeneration of fetal intermediate (or mixed) and colloid adenoma In addition we find all grades of transition of the original adenoma into all types and combinations of morphological cancer mentioned in the literature except pure papilliferous adenocarcinoma and pure scirrhous carcinoma These various combinations of adenoma and morphological cancer are present in the series of tumors and frequently in a single tumor The quantity of tissue that may be recognized morphologically as cancer is in inverse proportion to the remnant of the original adenoma In some cases there are only a few small scattered areas in other cases the cancerous change is more or less generalized but rarely is the adenoma remnant completely lost even in advanced cases

The ultimate microscopic appearance of the tumor is determined by a number of factors among which may be mentioned the character and condition of the original adenoma the duration of the lesion the rate of growth the character and degree of reaction simultaneously or subsequently initiated in the supporting stroma scar or capsule the blood supply and the degenerative changes that have taken place There may be and doubtless are other factors difficult or impossible to evaluate The above circumstances afford an interminable variety of histological pictures for the group and for individual tumors It is with rare exceptions that one histological form prevails throughout the whole tumor

In view of the innumerable variations and combinations of histological alteration in the cells and tissues of these tumors individually and as a series it would seem that the reliability of diagnosis on the basis of pure morphology would depend very largely on the personal experience of the observer with these lesions It is no doubt a fact that certain types of histological abnormality (Figures 11 12 18) may be in themselves sufficient grounds for a diagnosis of carcinoma or malignant adenoma for our material seems to indicate that certain of these histological pictures are invariably accompanied by other evidences of malignancy such as invasion of the capsule invasion of the blood vessels recurrence or metastasis It remains for each individual on the basis of his experience to determine how many different types of histological abnormality may be reasonably accepted as indicative of malignancy In the 98 tumors under discussion a diagnosis of carcinoma or malignant adenoma can be made with confidence on the morphology of the cells and tissue in 30 to 40 per cent of the cases In the remaining 60 to 70 per cent malignancy can be neither affirmed nor excluded on such basis If we consider the 55 tumors designated malignant adenoma only diagnosis may safely rest on morphology in about 60 to 70 per cent but there still remain a percentage in which the microscopic appearance of the tissue cannot be relied upon although the tumors may show the grossest kind of malignancy otherwise The most evident inadequacy of microscopic appearance as a criterion of malignancy becomes apparent in connection with the 43 adenomata formerly considered malignant but now classed as benign Here the character of the cells and tissue can be duplicated in any number of tumors known to be malignant and yet in none of these 43 adenomata has there been any clinical or pathological evidence of malignancy other than the suggestive or questionable histological alteration and there have been no recurrences metastases or deaths due to the disease in any of the patients traced We emphasize again that these 43 tumors have been previously diagnosed as malignant on morphological grounds

It is very probable that in the past others as well as ourselves have placed too much

reliance upon the histological character of the cells and tissue as an index of malignancy In the light of our later experience and a study of the end results we have come to the conclusion that so far as diagnosis is concerned it makes very little practical difference what the tumor looks like under the microscope whether the cells be large or small flat cuboidal or cylindrical fetal or adult differentiated or undifferentiated deeply staining or faintly staining whether mitosis be abundant or absent whether there be colloid or absence of colloid whether the cells be arranged in a single layer or multiple layers in the vesicle whether the vesicle wall be thrown into papilliferous folds or not whether the cell be arranged in follicles sheets masses columns or alveoli whether the stroma be abundant or scanty whether degenerative changes be absent or extreme— all of these things are a part of the histology but are not the most important evidences or signs by which to recognize malignancy The malignancy depends upon the tendency or capacity of the tumor to invade locally cause local destruction recur after operation give distant metastases and finally to result in the death of the patient There can be no metastasis until there has been some kind and degree of local invasion Therefore local invasion is the most important index of malignancy

INVASION OF SURROUNDING TISSUE AS EVIDENCE OF MALIGNANCY

Thyroid carcinomata not arising in adenomata have no capsule When tumors of this character grow beyond their site of origin they follow the tissue planes and spaces find ready access to the lymphatic system and hence metastasize chiefly to the regional lymph nodes

Carcinomata originating in pre existing adenomata are primarily encapsulated Subsequently they may invade and cause more or less extensive but rarely complete destruction of the capsule After the capsule has been penetrated or perforated further growth and extension of the tumor into the surrounding tissues and lymphatics occurs in a manner similar to that obtaining in those cases not originating in adenoma As long as these tumors are still within their original capsule there is no invasion of the lymphatics quite irrespective of their microscopic appearance They may be malignant nevertheless and cause the death of the patient as a result of distant metastasis through the blood stream

INVASION OF THE BLOOD VESSELS AS EVIDENCE OF MALIGNANCY

It has been known for years in connection with individual cases that well advanced carcinoma of the thyroid shows a marked tendency to break into the blood vessels (usually veins) and to grow within their lumina toward the heart In some reported cases tumor thrombus has extended continuously from the thyroid tumor to the right atrium in a number of cases it has been found to extend to the innominate vein or superior vena cava in a still greater number of cases it has been found in the jugular and thyroid veins Our first recognition of this phenomenon in a well marked degree was in 1914 (11074)

The tendency to invade blood vessels accounts for the high degree of frequency of metastasis to the lungs and also for the relatively less frequent but still striking distant metastases of which those to bone are common This peculiarity of thyroid tumors has a close parallel in hypernephroma

Invasion of the blood vessels is not a strange phenomenon when one considers that at least 90 per cent (Table) of malignant (epithelial) tumor originate in a pre existing adenoma and that even in the early stages of the transformation of benign to malignant lesion the epithelial cells lie closely on the blood vessel endothelium with little or no fibrous stroma between It is a simple matter for the tumor cells to break into the endothelial lined spaces either spontaneously or as the result of trauma and grow there locally form tumor thrombi extending in continuity a greater or less distance along the blood channel or for clumps of cells or portions of tumor thrombus to break off and be transported by the blood stream to distant parts of the body

Naturally the first lodging place should be the lungs Should the embolus pass the pulmonary capillaries it might lodge in any di

TABLE I—ONE HUNDRED EIGHT EPITHELIAL TUMORS

	No. of cases	Types	Adenomata [illegible]		Invasion of blood vessels	Results		
			P[illegible]	[illegible]		Traced	Dead	Living
Carcinomata		S[illegible]						
	8	Papilliferous carcinoma	6			7		6
	55	Malignant adenoma		†	[illegible]	37	7	
	65	Total	9	6 7	55/65 84.7%	46		[illegible]
Adenomata formerly classed malignant [illegible] benign	43	—		—		6	‡	5

[illegible]

tant tissue or organ (most commonly bone) and there develop a secondary or metastatic growth. Should the embolus not pass the pulmonary capillaries secondary or metastatic nodules may develop in the lungs. This might be the only metastasis or from it tertiary nodules may be set up in various parts of the body either through the blood or lymph channels. In either case the morphological character of the metastases corresponds usually to some portion of the original metastasizing tumor.

The recognition of invasion of the blood vessels is not so difficult as might appear on first thought. It is not so subtle as to require innumerable blocks of tissue for examination nor for practical purposes are serial sections necessary. The chief requirement is for the pathologist to know that such a sign of malignancy exists and exists with such a high degree of frequency as to be worthy of recognition as a working rule. It then becomes a mere matter of looking for this peculiar manifestation of thyroid epithelial malignancy. From the standpoint of the pathologist alone with no knowledge of the clinical or operative findings the gross tumor should be sufficient to direct the attention of one experienced in these lesions to a search for invasion of the blood vessels. Examination of the thyroid veins the veins of the capsule and the veins of the tumor immediately beneath the capsule will disclose gross thrombus and gross erosion when present and this can be verified easily under the microscope. When not advanced to the degree of gross lesion a few blocks through the capsule and tumor tissue and from any suspicious area or areas within the tumor will usually suffice for the microscopic demonstration of the invasion.

Naturally the degree or extent of invasion is variable just as is the case with other evidences of malignancy. Four grades may be noted (1) gross thrombus (Figure 2) (2) gross erosion (3) microscopic—tumor cells or tumor tissue within the blood vessels (Figures 12 to 21) (4) microscopic—erosion of the wall of larger blood vessel other than capillaries or sinuses (Figure 19).

The character of the tissue found within the blood vessels corresponds morphologically to some portion of the original tumor and is quite independent of the presence or absence of what might be called morphologic cancer. (Compare Figures 13 to 21 with Figures 5 to 12.) It is conceivable that varying degrees of differentiation and dedifferentation might progress in tissue growing within the blood vessels and thus afford as great a variety of histological pictures as is commonly found in the original tumors. On the other hand it is equally conceivable that in a given case portion of tumor tissue of totally different histological appearance might grow into the blood vessels without essential morphological alteration. Which of these possibilities predominates in these thyroid tumors we are not prepared at present to state. The question is worthy of further observation and future investigation.

The incidence of blood vessel invasion has been a surprise We are not aware that there has been any effort made to determine the incidence in a series of cases nor to utilize the fact of invasion as a means of distinguishing between benignancy and malignancy As previously noted the only malignant epithelial tumors in which we have failed to find invasion of the blood vessels have been scirrhous and papilliferous adenocarcinomata which together represent about 15 per cent of the total and are primary lymphatic invaders Blood vessel invasion has been as consistently absent in these two groups as it has been constantly present in all other epithelial malignancies

Referring again to the 55 carcinomata designated malignant adenomata and the 43 *adenomata formerly considered malignant* but now classed as benign it may be stated that in the former group invasion of the blood vessels has been noted in all cases whereas in the latter it has not been observed in any case When it is recalled that in the latter group the morphological character of the cells and tissue is strongly suggestive of early malignant adenoma or beginning adenocarcinoma and that *in the former group* (55 malignant adenomata) there are a number of cases in which the morphology cannot be relied upon (Figures 5 and 6) the question of blood vessel invasion may be the determining factor in diagnosis The tumors may be entirely encapsulated in both instances

The greatest value of invasion of the blood vessels as an aid to diagnosis is in those encapsulated tumors (adenomata) in which other evidence of malignancy is wanting and the microscopic appearance of the cells and tissue is not sufficient ground for a decision

EXPLANATION OF ILLUSTRATIONS

In Figures 1 and 2 we present photomicrographs of the thyroid of a fetus at 3 months for comparison with Figures 3 and 4 taken from a single encapsulated tumor that is malignant

Figures 3 to 12 were taken from a single encapsulated tumor showing various stages in the transformation of fetal adenoma to carcinoma According to our conception this tumor was originally a fetal adenoma which in the course of time has undergone a high degree of differentiation (Fig 5) At some time in its life history there ensued another change of an entirely different character the end result of which is shown in Figures 11 and 12 with Figures 6 to 10 representing intermediate steps in the process The quantity of tissue as shown in Figures 11 and 12 is relatively small More than half of the tumor is made up of tissue such as that shown in Figures 5 to 10 Note how closely some areas resemble the thyroid of a fetus (compare Figures 3 and 4 with Figures 1 and 2) Other areas (Fig 9) resemble some thyroids seen in exophthalmic goiter From a purely morphological standpoint many of the microscopic pictures in this series (Figs 3 to 12) can not be recognized as cancer One would not hesitate to say that Figures 11 and 12 are cancer On the other hand Figures 5 6 and 10 from the same tumor are identical morphologically with any number of benign fetal and colloid adenomata That Figure 5 may be malignant is difficult to believe from its histological appearance nevertheless its exact counterpart is found in abundance in the thrombosed thyroid veins of this case (Figs 13 and 14)

In Figures 13 to 21 we have a series of photomicrographs of tissue completely within thrombosed thyroid veins such as that shown in Figure 22 *C* Note the many areas that cannot be recognized morphologically as cancer Note also the variety of histological pictures present in the veins of a single case

Figure 22 is a photograph of a gross specimen from which all photomicrographs except Figures 1 and 2 were made Figures 3 to 12 are from the malignant tumor Figures 13 to 21 are from thrombosed thyroid veins (Figure 22 *C*) *B* is a benign fetal *adenoma the microscopic appearance of which* is shown in Figures 23 and 24.

In Figures 23 and 24 we have photomicrographs of the benign tumor (Fig 22 *B*) Figure 23 shows partially differentiated fetal adenoma. Figure 24 shows a histological variation frequently seen in tumors known to be malignant yet this particular tumor is entirely encapsulated shows no gross or microscopic invasion of the capsule and no invasion of the blood vessels It is therefore benign

The ultimate reliability of invasion of the blood vessels as a point of differentiation between benign and malignant adenomata is a matter for the future but on the basis of our experience to date it seems well worthy of considerable confidence

CONCLUSIONS

1 At least 90 per cent of malignant tumors arising from thyroid epithelium have their origin in pre existing adenomata (Table I)

2 The morphological character of the cell and tissue is an unreliable basis for the determination of malignancy of thyroid epithelial tumors



Fig 1 Thyroid of fetus



Fig Thy d of f tus x 5



F 3 T tal adenomatous area in m l nant t m r x100



Fig 4 Same p men as in Figur 3 2



F g 5 Coll d ade m to s a e n mal nt tum oo



F 6 Specimen f om mal g ant t mor x100



Fig 7 Specimen f m mal gnant tumor x100



F g 8 Specim from mal gn t tumor x oo



F g 9 Specim n f om mal gn nt tumo x100



Fig 10 Specimen from malignant tumor x100



Fig Specime from malignant tumor x100



Fig 12 From same specimen as in Figure 1



Fig 3 Tissue in emin 100

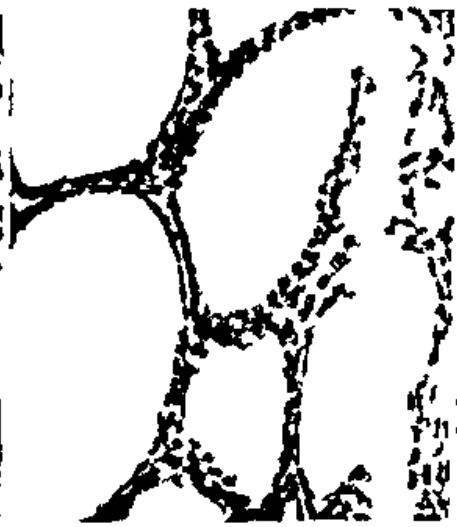


Fig 14 From specimen at Fig 13 x250



Fig 5 Tissue in x100



Fig 6 Tissue x100



Fig 7 Tissue vein x100.



Fig 18 Tissue in vein x100.



F 9 Γ n of em all o Γig Γh mb d n F 2t T m t uc in v yr

3 The malignancy of thyroid epithelial tumors depends upon their tendency or capacity to invade the capsule surrounding tissue lymphatics or blood vessels

4 The most constant single indication of thyroid epithelial malignancy is invasion of the blood vessels

5 Scirrhous and papilliferous adenocarcinomata are the only two types of epithelial malignancy in which invasion of the blood vessels has not been observed These two types together constitute about 15 per cent of the total and are primary lymphatic invaders

6 Epithelial tumors that are encapsulated and show no invasion of the blood vessels are benign irrespective of their microscopic appearance otherwise

7 Epithelial tumors in which one finds invasion of the blood vessels cannot be regarded as entirely harmless irrespective of their microscopic appearance

8 The term carcinoma is proper for epithelial tumors of the thyroid that are malig



Fig 2 P th No 1 447 *A* M l gn t ade oma *B* b gn ade oma *C* thrombo ed ve n

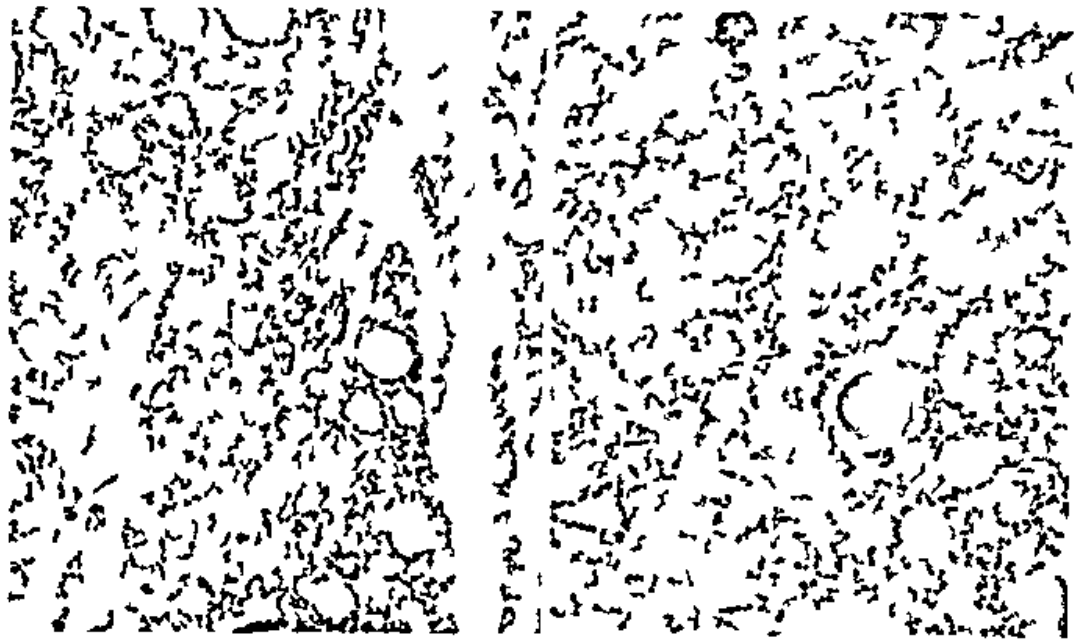


Fig. 23.—Partially differentiated adenoma (Fig. 3, *B*). ×25.

Fig. 4.—Benign adenoma (Fig. 3, *B*). ×25.

nant regardless of their microscopic appearance. The term *malignant adenoma* is useful and convenient for the purpose of denoting a subgroup under carcinoma but is not strictly speaking correct terminology. Such terms as *wuchernde struma* proliferating adenoma metastasizing adenoma metastasizing colloid struma metastasizing colloid goiter and metastasizing normal thyroid are confusing misleading inaccurate serve no useful purpose and should be eliminated.

9. In view of the present available data the diagnosis and classification of malignant epithelial tumors of the thyroid present no greater difficulties and require no more complicated nomenclature than is commonly encountered in other organs and tissues of the body.

I [illegible] pamphlet [illegible] Clinical [illegible] exclusively furnished the basis for this study at the Clinic of Clinical Surgery of the Medical Faculty of Kazan. [illegible] suggestions [illegible] manuscript.

OSTEOCHONDRAL FRACTURE OF THE KNEE JOINT

By ARTHUR KRIDA M D F A C S New York
A ta t S g t O t P t t H p t l f th R pt d d C ppl t

THE purpose of this paper is to describe as a clinical entity an injury of the knee joint which corresponds in some particulars to Koenig's osteochondritis dissecans and to show that it consists of three phases the last phase being that of a free osteocartilaginous body

The condition occurs usually in young adults and is produced by a direct blow on the knee The trauma produces an osteochondral fracture of a section of the articular portion of the internal condyle without primary displacement of the detached fragment

THE FIRST PHASE

Whether from an inherent repair defect of the cancellous tissue of the condyle or which seems more likely from failure to provide the extraneous conditions of bony union the fragment remains partially or nearly wholly separated but still occupies its original situation in the condyle The fragment has an irregularly oval outline and its edges are serrated It is loosely united to the underlying condyle by connective or fibrous tissue This first phase of the fracture of the joint corresponds essentially with osteochondritis dissecans

THE SECOND PHASE

In the course of time the crater in which the fractured fragment is imbedded may become lined with cartilage as does also the deep face of the detached fragment The fragment is now entirely loose but still maintains its position in the condylar pit

THE THIRD PHASE—FREE OSTEOCARTILAGINOUS BODY

Under certain conditions a subsequent trauma dislodges the fragment and it becomes free in the knee joint If the displacement occurs during the first phase the freed body consists of cartilage on one side and bone on the other It subsequently becomes entirely covered with cartilage The crater in the condyle may also grow a lining of cartilage

DIAGNOSIS

The diagnosis in the first phase would depend upon the X ray demonstration of the picture that has been described as characteristic of osteochondritis dissecans[1] It is interesting to note that such X ray demonstration could not be determined either prior or subsequent to operation in the first of the cases reported below in X rays taken in the usual manner Since the fracture is usually posterior to the median plane of the condyle it is easy to see why it may be missed

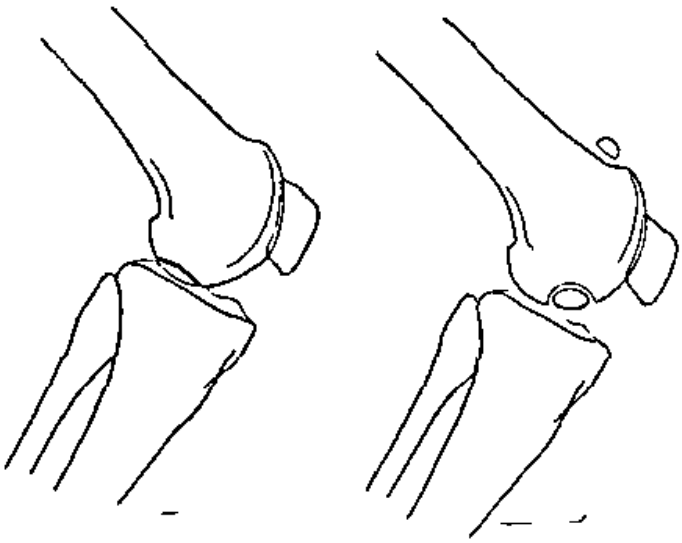
In the second phase the delineation of the fragment is more distinct In the X ray it looks like an area of condensation in the substance of the condyle The diagnosis of the third phase requires no comment

TREATMENT

If it be assumed that no inherent repair defect resides in the cancellous tissue of the condyle and if the diagnosis could be made reasonably soon after the fracture it would seem logical to create the conditions favorable to repair by relieving the joint of function That such a diagnosis will be made sufficiently early for one reason or another in any considerable percentage of cases is unlikely From a practical standpoint therefore the treatment is very apt to resolve itself into arthrotomy

It will be seen that an adequate exposure of the joint is necessary The incision employed in the 3 personal cases was a curved antero internal incision beginning at the tibial tubercle curving inward to avoid the fat pad then outward toward the supero internal angle of the patella then upward and inward following the intermuscular plane between the rectus femoris and the vastus internus The

[1] A H F berg Os eoch nd d sec ns J Bo & J 1 S rg



First a l sec l ph

quadriceps pouch is widely opened to its upper border The patella is *then displaced* outward over the external condyle and the joint flexed This gives an adequate exposure of all parts of the joint except the small posterior compartment In suturing the various layers are approximated with some care The convalescence is easier than that following a split patella incision

The following 4 cases are reported as illustrative *of the three phases of osteochondral* fracture described above The first 3 of these cases were personal cases and the last is a case operated upon by Dr E E Van Derwerker assistant surgeon at the Hospital for the Ruptured and Crippled to whom I am indebted for the notes of the case

CASE ILLUSTRATING THE FIRST AND THIRD PHASES

Case 1 B P age 28 male single seaman was seen first on November 12 1923

History On June 20 1923 while working in the hold of a boiler on board ship he struck his left knee with some force against the side of the boiler The knee was slightly swollen the next day but he was given a light job to do and therefore did not lay off work

In a few days he noticed that in walking he would have a sudden catch in the knee and at such time he would have to stop and manipulate the knee in *order to get it going again These attacks became so* frequent that in August 1923 he had an operation on the knee for the removal of two loose bodies which he states could be felt Only one of these was successfully removed the other not being found

He states that since the operation this second body has traveled all about the joint and that two weeks ago he had a slight sprain of the knee after which the body *localized* on the postero internal aspect of the joint He states that at the present time there is discomfort of this region and that he has a catch similar to the condition that prevailed previously He also notes a slight atrophy just above the knee

Examination shows a young man in good condition who presents a 1 ½ inch scar of operation on the inner aspect of the left knee There is some evident shrinkage of the quadriceps just above the knee joint There is some fullness in the region of the infrapatellar pad of fat There is an old and indistinct burn scar on the outer side of the knee together with slight knock knee deformity

The movements of the joint are complete in all direction and the stability is good At the posterior aspect of the joint almost on a plane with the internal surface of the lower extremity and at a horizontal plane about ¾ inch above the tip of the condyle and just in front of the sartorius tendon insertion there can an indistinct partially movable slightly tender hard mass about ¾ inch in diameter which disappears when the joint is flexed

The X ray shows the presence of a shadow corresponding in situation to the loose body described above

Conclusions While the presence of a loose body in the posterior compartment of the joint as definite it seemed to me in view of its position that it did not entirely account for the instability and repeated locking of the joint I therefore determined to first try and get this small bit out through a small postero internal incision and then to explore the joint anteriorly

Operation was performed at the U S Marine Hospital No 60 November 14 1923 A 1 inch incision was made in the postero-internal aspect of the left knee in the region where the supposed loose body was felt The joint capsule was opened and the surrounding joint space exposed No foreign body was found The incision was closed

A typical anterior internal incision was then made as above described The synovia was awhile as normal in appearance Lying on the nethermost portion *of the internal condyle and slightly* behind the mid line and imbedded in its surface was an irregularly oval osteocartilaginous body about ¾ inch in its greatest diameter and about ⅛ inch thick The condylar pit was lined with granulation tissue and cancellous bone *This body was attached only at its* posterior portion by a stout fibrous tissue the whole anterior portion being free This was excised and the rest of the joint explored for additional loose bodies of which none were found The posterior compartment could not be thoroughly explored The joint was then closed in layers and firmly bandaged after cotton and placed in a Thomas splint

January 2 1924 The patient has been discharged from the hospital three weeks after operation the incision having healed by primary union On account of persistent discomfort in the region of the loose body in the posterior compartment which I



Later l d a ter posterio oe tg n grams of kne in C se 2

failc l to find at the first operation I reopened this joint posteriorly through a 3 inch ncı ion on Jan uary 2 19 4 \ /4 inch in diameter osteocartilag inous body \ as found imbedded in the capsule of the joint and projecting slightly into it Th was shelled out and the incision closed

Feb uary 4 1924 The patient has been walking about \ ithout discomfort and he states that the locking sensation and instability have been entirely rel eve l There is still some evident shrinkage of the quad iceps muscle

CASE ILLUSTRATING THE SECOND AND THIRD PHASES

Casl J S age 24 male single seaman as een first on January 7 1924 His complaint was of a movable body in the left knee joint

History Three months ago hile going along the ship he struck his left knee against an iron projection the outer side of the knee being struck ith some force There was not ve y g eat immediate pain but about 4 days later he felt a sudden se e e pain on the uter side of the knee the knee locked began to swell and f r 3 we ks he could not get it straight At the end of this time the knee was strapped an l he apparently got quite well After this time he had 5 or 6 attacks of locking with swelling pain and dis ability One week ago he noticed a movable loose body just above the knee cap which he states moves all about the knee

Examination shows that there i a vi ible enlarge ment in the suprapatellar pouch There is no effu ion and no infiltration The enlargement is found to be lue to the presence of a movable smooth painles hard body about ¾ inch in diameter \ hich can b d splaced to any portion of the suprapatellar pouch otherwise the knee is not abnormal on physical e am nation

The \ ray shows the presence of the above de sc ibed body in the suprapatellar pouch about 1 inch above the patella on the inner side It also shows apparently imbedded in the substance of the in ternal condyle another loose body which is about / inch n transverse diameter and seems to be lying in the condyle more towards its posterior portion

Co clusions The condition appeared to be osteo chondral fracture with one attached and one free osteocartilaginous body

Operation was performed at the U S Marine Hospital No 9 January 9 1924

A typical anterior internal incision was made The synovium was opened and it was seen that there was a moderately increased amount of fairly thick straw colored fluid Lying in the suprapatellar pouch was a 1 inch in diameter smooth osteocartilaginous body This was removed The patella was then replaced over the external condyle and the joint flexed exposing its anterior surface lying on the lower surface of the internal condyle and somewhat posteriorly to the midline was a ¾ inch in diameter osteocartilaginous body which was loosely imbedded in a depression of similar size in the condyle which depression was also lined with smooth cartilage This body was attached by a thin layer of fibrous tissue at about ¾ inch in diameter It was removed At the edges of the depression the cartilage was fairly loose in two situations and these two loose bits were removed by excision The synovium the fat pad and the semilunar cartilages appeared of normal

The joint was closed in layers and dressed over a thick cotton dressing

January 24 1924 The patient had been walking about the ward the incision having healed by primary union He was discharged from the hospital to return to work

TWO CASES ILLUSTRATING THE THIRD PHASE

CASE 3 W W age 50 male single was an engineer

History Five weeks ago he struck his right knee against a metal pump with some considerable force There was no immediate disability and he went on with his work Two days later developed consisting of pain and swelling in the knee and inability to get it straight He was treated by bandaging Pain swelling and disability have continued without change until the present time

Examination shows that the right knee joint as a whole appears moderately enlarged He walks with a limp and with the knee held at an angle of 160 degrees The enlargement is found to be due mainly to intra articular effusion although there is some slight infiltration on the inner side of the knee Movements of the knee are from 160 to 100 degrees Stability is good There is rather marked tenderness on pressure over the inner third of the knee particularly *over the articular surface of the internal condyle* There is marked pain on outward rotation of the leg on the thigh Lying to the inner side of the condyle and apparently in the condylar fossa is a loose fragment which is probably a free body

X ray examination of the right knee joint shows two osseous shadows one above and one below the patella within the knee joint The size of each is about that of a lima bean

Conclusions X ray diagnosis was made of osteochondral fracture of the knee joint with free bodies

Operation was performed at the U S Marine Hospital No 70 March 3 1924 A typical anterior internal incision was made One smooth ¾ inch in diameter oval osteocartilaginous body was free in the suprapatellar pouch This was removed The synovium of the pouch was normal in appearance At the upper portion of the pouch there were several irregularly transverse septa which were not disturbed The patella was replaced over the external condyle and the knee flexed during which procedure a ¾ inch in diameter oval osteocartilaginous body shot out of the wound This body was not as smooth as the first one and had a somewhat studded appearance but was entirely covered with cartilage Upon flexing the knee to good degrees it was seen that the articular cartilage on the external surface of the internal condyle was rather markedly roughened from a point well in front of the midline backward the roughened area terminating in a portion of the condyle which was entirely denuded of articular cartilage This latter area was about ¾ inch in diameter and was situated at the extreme posterior portion of the condyle and was somewhat depressed Overhanging the depression was a somewhat loosened fringe of articular cartilage which was excised The area of cartilaginous roughening on the condyle was apparently due to constant attrition of the second of the above mentioned loose bodies which apparently had been situated just in front of the anterior crucial *ligament*

The internal semilunar cartilage was then excised A ½ inch redundant synovial fringe in the lower portion of the quadriceps pouch was excised The ligamentum mucosum was divided and the external portion of the joint was inspected and found to be apparently normal The fat pad and alar ligaments were not enlarged except the portion of the alar ligament on the inner side was thickened and fibrosed and this was excised

The joint was closed in layers

The patient was discharged from the hospital on the fifteenth day the incision having healed by primary union

CASE 4 (Dr Van Derverker's Case) F V age 47 male has pain in the *left* knee with a history of repeated slipping out sensation in which the knee gives way and he must massage the knee for some minutes and then limp about for several hours afterward

The duration of the condition is about fifteen years

History About *fifteen years ago the patient* was riding a mowing machine when something in the machinery caused him to be thrown quite violently from the seat to the ground where he landed on his left knee Following that injury he was laid up for several days and was treated by a local doctor He had swelling about the knee and water in the joint Since that time he has had return attacks in the knee has always spread that knee more than the other and has had to wear a rubber elastic knee cap to prevent the slipping out sensation

Examination made in September 1920 showed the following

The left knee was somewhat larger than the right Angle of greatest extension 170 of flexion 100 The patella was free and moved easily There was considerable tenderness at the inner side of the knee joint over the inferior surface of the inner condyle and also in the region of the internal lateral ligament but not enough to suggest a dislocated cartilage Just beneath the quadriceps tendon and just above the patella at its outer side was felt a small movable mass which could be pushed inward and outward in the patellar pouch This was identified by the patient as being the thing which slipped out and gave him so much discomfort when the knee was flexed and under tension He was advised to have the foreign body removed and the knee joint explored

In February 1921 the patient was admitted to the Hospital for the Ruptured and Crippled and the left knee explored

The usual Jones incision was made in the region of the left internal semilunar cartilage and the knee joint was opened and semilunar cartilage was found to be firmly attached and evidently not the cause of any trouble The lower surface of the internal condyle was examined with the tenderness on previous examination in mind and the cartilage in this region was found to be reddened and granular and there was a depression about the size of a finger nail on the joint surface which occurred to us as being probably the source of the loose body which were removed after transfixing with a needle and making incision down to the patellar pouch The loose body was irregularly shaped like an almond about 1/4 by 1 inch and was attached to the synovial membrane by a thin fibrous strand and had a shiny cartilage like surface The knee joint was closed and the patient remained in bed for 5 days and was allowed to go home in a week The specimen was retained by a patient

Subsequent history The patient has no more slipping out sensation and is able to go without the knee bandage The leg can be fully extended and flexed to 80 degree There is still tenderness over the internal condyle and on rainy days the patient's knee aches also when walking or working hard

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MYOSITIS OSSIFICANS

A Clinical and Radiological Study

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MYOSITIS ossificans was first described nearly 100 years ago Since that time many cases have been reported in the literature and many cases must have been diagnosed and treated which have not been reported A report of the group of 18 cases observed in the Mayo Clinic in the last 13 years may help to indicate the age incidence sex and the relative frequency with which it appears in various muscles

The traumatic type of myositis ossificans is important because of its close similarity to sarcoma The etiology and clinical manifestations of these two diseases have many points in common and mistakes in diagnosis have doubtless been the cause of the loss of many limbs myositis ossificans traumatica being mistaken for sarcoma It is probable that the converse is also true cases of sarcoma being diagnosed as myositis ossificans and the disease becoming advanced with secondary growths before its true nature was discovered The difficulties of diagnosis must often be considerable even to clinicians of great experience as shown by the discussion between Morley and Gould published in the *British Medical Journal* following a paper by the latter on the treatment of sarcoma of bone by radium The case described by Coley also gives an idea of the difficulties in diagnosis

The great European war must have produced many cases of myositis ossificans Those that have been described in the literature have clearly shown that it may occur after open injuries whereas formerly it was ascribed to closed injuries still more recently cases have been described in which no history of injury was obtainable

DEFINITION

Under the term *myositis ossificans* are included several distinct pathological and clinical entities

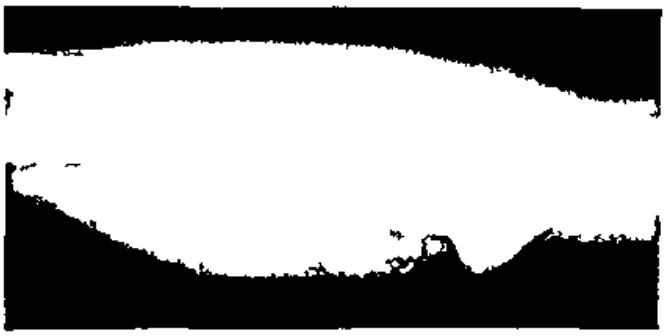


Fig. Case 1. My ti f oc n g th fl r m scl f the fore m \ h t ry f tr ma (tract re of th te l f the ri g ll til g rs

1. Myositis ossificans progressiva. This is a progressive disease coming on in early life sometimes soon after birth of unknown etiology in which all the muscles of the body are slowly converted into osseous tissue.

2. Myositis ossificans circumscripta generally known as the muscular osteomata and appearing in sites of repeated slight injuries or irritations such as rider's bone.

3. There is a third form of the disease which is also localized to one site in the body but is the result of a variety of etiological factors the commonest of which is a single severe closed trauma. It may be merely a contusion or a dislocation but since the great European war it has been shown to follow tangential bullet wounds. Other forms develop after an abdominal operation especially on the stomach. It is difficult to determine what bearing the gastric juice may have on the condition in any case a bony or periosteal injury could not have taken place. Some of these cases have been complicated by septic infection others have healed by first intention. Others are described in which a complete muscle has become ossified following a pyemic abscess. *There is still another form in which no history* of injury can be obtained and in which a complete muscle slowly becomes ossified. Such a form is one of the most interesting and seems to bear some relationship to the generalized and progressive type of disease and to be analogous to the generalized and localized forms of osteitis deformans. The third form of the disease only will be referred to in this paper.

THEORIES OF CAUSATION

Many theories have from time to time been put forward to explain the causation of myositis ossificans but no one seems to offer an explanation satisfactory for all cases. The various theories are briefly as follow:

1. Diathesis. The patient possesses a peculiar diathesis called by Virchow the ossifying diathesis.

2. The escape of synovial fluid. Ewald suggested that the escape of synovial fluid from the knee or elbow afforded the necessary stimulus for the ossifying process.

3. The mechanical theory. A severe subcutaneous injury usually a blow may or may not produce a dislocation but the muscle fibers are lacerated and the periosteum torn



Fig. Case 2. Myositis ossificans affecting the left thigh following closed trauma.



Fig. 3. Case 3. Myositis of the quadriceps femoris following dislocation of the hip. X-ray taken after injury.



Fig 4 Case 4 Myo tis o sif ans in muscl s n the n r and a te r a pect f th h m ru f ll b pu pe l septi am



Fig 5 C se 4 My ti os fca s in the muscles on th e nd anter o a pect of the hum ru f llo ng p rpe al jt æmia

The muscle fibers retract carrying with them the periosteum or the periosteum plus a scale of bone The osteoblasts settled in a new and a uitable nidus produce bone

4 Metaplasia The initial change is an interstitial myositis with a transformation into bone of intramuscular connective tissue The growth is not derived from bone and any attachment to bone is secondary and accidental

5 Tumor formation This must of necessity be an innocent growth as it shows no tendency to infiltrate tissues or to metastasize Coley has reported a case in which there was a malignant transformation and metastasis but there was some doubt regarding the original nature of the case

6 The organized blood clot is slowly transformed into cartilage and then into bone

7 Aberrant sesamoid bones

On consideration of the anatomical di po i tion of the two most common sites that is the quadriceps and the brachialis anticu we find that both the e mu cles take origin from ex ten ive plane surfaces of bone hence the periosteum i not o firmly attached and more readily gives rise to breiche of continuity and the periosteum with its cale of bone can be readily drawn up into the overlying mu cle

A con iderable amount of experimental work has been done on animal with regard to the production of myo itis o ificans and attempts to produce injuries to the perio teum have been made on the cadaver Davi and Hummecut tran planted a cale of bone with the periosteum attached to the mu cles and subcutaneous ti ues of the rabbit new bone was produced in each case but the amount seems to have been disappointingly small and in time this bone was absorbed These author conclude that periosteal flap with bone shavings attached produce new bone Berthier carried out similar experiments chi elling pieces of bone off the shaft and allowing the muscles to draw them away but he found that the contusion was difficult to produce with a chisel and the bone never grew much larger than the flap which was cut Marcus carried out some experiments on the cadaver He tried but failed to detach bone by pulling on the muscles however the conditions are not the same as in the living Morley curetted the periosteum from the bone in rabbits and con tused the muscles He asserts that the same change took place as in human beings

No one theory appears to explain all the types of myo itis ossificans Some appear to be entirely mechanical in origin and one can not but think that the o sifying diathesis of Virchow plays a part in addition to injury in the cases in which myositis o sificans de velops in both quadricep after comparatively minor trauma of a closed nature the interval between the two traumas may be several month or a year The mechanical theory appear to be borne out by a certain amount of experimental evidence and still more so by the cases following tangential gunshot wound This theory appears to give a satisfactory explanation of the cases following a closed tangential blow The lacerated muscle fibers contract carrying periosteum and osteogenetic cell with them into a nidus of lacerated mu cle and blood clot or from an area of bone denuded of its periosteum and bone corpus



Fig. 6. Case 5. Myositis ossificans following posterior dislocation of the elbow. Four weeks after injury.



Fig. 7. Fig. 8.

Fig. 7. Complete transection from boat muscle (×40 26).

Fig. 8. Section from center of the mass showing osteogenetic tissue with immediate transition of fibrillated connective tissue into pathologic bone formation (×416 26).

cles pass out by ameboid movements into the blood clot. These bone forming cells placed in a new medius take on new life and produce new bone. The theory of metaplasia seems to offer a satisfactory explanation for another group of cases especially those which follow a pyemic abscess an abdominal operation or appear spontaneously without injury. The change set up is an interstitial myositis with the transformation into bone of the intermuscular connective tissue the growth is not derived from bone and any attachment to bone is secondary and accidental. The easiest transition would appear to take place in the abdominal wall following abdominal operations the linea transversæ which are the relics of abdominal ribs passing back to their primitive state of osseous tissue.

MICROSCOPIC CHARACTERS

The microscopic characters distinctly favor the mechanical theory. The cells infiltrating the muscles are merely osteoblasts. They can be seen everywhere and in every shape and transition from the mature osteoblasts to the undifferentiated connective tissue cell. The cartilage cells are really an intermediate stage. The presence of cartilage in the center of the bar of bone is explained by its lower vascularity.

SITES AGE AND SEX

Several authors during the last 15 years have recorded groups of cases indicating the relative frequency of the various sites in which the disease occurs and the age and sex of the patient. Jones and Morgan record 339 cases partly their own and partly collected from the literature in order of frequency they find the following muscles involved: brachialis anticus quadriceps adductor longus and biceps. Schultz gives a record of 10 years experience in the German army and reports 33 cases showing that the disease is more frequent than is generally believed the quadriceps and brachialis anticus were the site of disease in all but 3 cases 2 of these involved the masseter and 1 the pectoralis major. Strauss records 127 cases chiefly in muscles of the arm in order of frequency the muscles involved are brachialis anticus quadriceps adductors gluteal temporal and thumb muscles. Most of the other series of cases are small in number and include a large variety of muscles. Ewald reports cases in the deltoid triceps biceps adductor magnus and subclavius all following injuries. Horvath reports a case in which the disease developed in both iliac muscles following manipulation of a flexed and adducted hip joint. Lewis reports cases in which the condition occurred in the anterior abdominal wall following operation. Schartz observed the condition in the gluteal muscles following a cut from glass. Elmslie in the gluteal muscles following a metastatic abscess and Whitelocke in the soleus.

The great bulk of the cases are in males and occur in early adult life when one is more likely to be exposed to injury although cases are recorded having occurred as early as at 5 years of age and as late as 65 years.

Muscles affected in the 18 cases in this series are

	CASES
Quadriceps	6
Brachialis anticus	5
Quadratus femoris	
Sternomastoid and biceps	
Tensor fascia femoris	
Flexor muscles and toe	1
Tibialis anticus	
Coracobrachialis	

Fifty per cent of the cases occurred between the ages of 15 and 25 years the youngest patient was 12 and the oldest 52 Thirteen of the patients were males and five females Operative interference was carried out in 7 of the 18 cases

CLINICAL APPEARANCES

The quadriceps and the brachialis anticus are the two commonest sites of the condition The condition in the quadriceps generally arises from a blow on the football field the trauma is generally closed and takes place tangential to the femur Myositis ossificans in the brachialis anticus is generally the result of a posterior dislocation of the elbow or an intra articular fracture of that joint After incurring an injury to the thigh on the football field the patient is generally able to finish the game but sometimes is compelled to leave the field A swelling slowly forms at the site of injury it looks like a hæmatoma is not generally painful but is tender to the touch and cause considerable limitation of movement of the neighboring joints The condition slowly improves for 10 or 15 days then it commences to increase in size pain develops and the movements which were increasing in range slowly begin to decrease the swelling now becomes increasingly hard and goes on to ossification The diagnosis from the third week onward is made clear by X ray

The clinical picture may be divided into three stages (6) (1) the tissues are infiltrated with blood (2) the swelling loses its elasticity and becomes indurated and (3) the swelling assumes a bone like consistency

X RAY APPEARANCE

In from 3 to 4 weeks the shadow is apparent by the X rays separated from the diaphysis of the bone by a zone of light This light shadow is very constant except where the callus is concave and encircles the bone When the disease develops in the brachialis anticus following a posterior dislocation the callus is frequently attached to the coronoid process and appears as a triangular or club shaped process The shadow is by no means a homogeneous one light areas appear here and there The light areas in the callus may indicate a cyst or cartilage The picture is continually changing and the shadow gradually grows darker and more homogeneous There is slow and steady increase in density until many months afterward when ultimately the callus becomes attached to the bone where probably in the first instance the periosteum became detached The zone of light between the diaphysis and the callus does not necessarily mean that the callus is free there may be a pedicle of spongy bone a broad zone signifies the absence of such an attachment If a complete muscle is involved the shadow is at first mottled and later becomes homogeneous Stripes and spots and later lamellæ appear which correspond to the ossification of the muscle bundles or fascial layers

DIFFERENTIAL DIAGNOSIS

The differential diagnosis applies particularly to the disease occurring in the quadriceps Many conditions have been mistaken for myositis ossificans occurring in that situation particularly sarcoma These two diseases have many points in common clinically etiologically and by X ray In both there may be a history of trauma generally closed trauma The length of time between the receipt of the injury and the appearance of the tumor corresponds in cases of sarcoma and of myositis ossificans the growth being rapid in both diseases Before bone begins to form that is during the first 2 or 3 weeks myositis ossificans cannot be distinguished from sarcoma except by the microscope later on the diagnosis is easily made by X ray

Besides these points of similarity however the two diseases possess several points of dissimilarity In myositis ossificans the growth usually ceases after a number of months and absorption takes place to a certain extent

In sarcoma growth continues unrestricted The position in relation to the shaft is helpful in differentiating the two conditions Myositis ossificans is more likely to occur in the middle of the shaft if in the thigh or at least away from the epiphysis In sarcoma the swelling is more likely to be at or near the epiphysis Myositis ossificans is uniformly hard on palpation In sarcoma in the midst of the hard swelling there are some areas which are softer and more yielding to pressure Pain is likely to be a feature in the early phases of myositis ossificans whereas in sarcoma there is rarely any pain in the early stages The disability in the neighboring joint is seldom noted in the early phases of myositis ossificans By X ray the shaft of the bone is shown to be *intact and the new bone is separated by a line* of light whereas in sarcoma the shaft of the bone is not intact

Coley recorded the only case in the literature of myositis ossificans developing into sarcoma There seems to have been doubt from the beginning as to the true nature of the condition although it was confirmed by microscopic examination The patient later *developed sarcoma and died of metastatic in*fection Coley concluded from this case that myositis ossificans will under favorable conditions develop into true sarcoma

PROGNOSIS AND TREATMENT

It is impossible to predict that any injury will produce myositis ossificans and the extent of the growth cannot be predicted with any degree of accuracy although doubtless it has some relationship to the severity of the injury and the area of bone denuded of its periosteum It is a comparatively rare condition considering the frequency of posterior dislocation of the elbow and contusion of the thigh which are its two commonest antecedents although the X rays show it to be much more common in minor degrees than is appreciated *The natural tendency is toward cessa*tion of growth after some weeks and a variable degree of reabsorption In fact in many cases perfect function has been restored The degree of disability depends on the mechanical embarrassment of the muscles and the neighboring joint In some cases whole muscles may be transformed into bone and cause a greater or lesser degree of disability and deformity depending on their site

In the past many lines of treatment have been advocated These differ widely Morley advocates simple excision of the bony mass with grafting of fascia over the denuded area Lapointe says extirpation of the mass 6 to 8 weeks after the trauma is the *method of* choice Shere advocates immediate aspiration and prolonged drainage until the tissues feel normal He considers this condition to be a forerunner of sarcoma Maddren says that unless serious disability exists and persists unimproved by active and passive exercises surgery is contra indicated The treatment of this condition naturally falls into two distinct *stages (1) the treatment of the two com*moner disabilities which may produce myositis ossificans namely posterior dislocation of the elbow and closed injuries of the thigh and (2) treatment of the complication when it has arisen

Treatment of the disabilities leading to myo sitis ossificans Posterior dislocation of the elbow should be reduced carefully and gently *under anæsthesia then fixed for or 3 weeks* in a completely flexed position with the forearm supinated the palm of the hand toward the shoulder At the end of 2 weeks if the tenderness on manipulation of the joint is gone the sling can be gradually lengthened and the patient move his arm back to the normal position If it gets stiff in a less flexed position and he is unable to flex the elbow *fully that is an indication that we are pro*ceeding too quickly the osteogenetic tissue is being irritated and further rest in the flexed position is necessary This irritation is shown by the production of local heat and by the muscles being on guard The arm should be put up in the acutely flexed position for another week then treatment renewed with voluntary movements and the gentlest of *massage In this way the process of repair* is carried on with the minimum of trauma to the fibrous and osseous tissues

Closed injuries to the front of the thigh should be treated by complete rest until the acute symptoms have passed Contusions are so common in this area that many pa

tients receive no treatment whatever until myositis ossificans has developed

Treatment of the actual condition Myositis ossificans generally appears about the third week earlier if injudicious movements have been carried out A definite mass in the muscle may be felt at this time and a distinct shadow can be seen by the X ray Two facts to keep in mind in the treatment of this condition are (1) simple excision in the early phases is invariably followed by recurrence and (2) the disability due to interference with locomotion may ultimately give way under physiotherapeutic treatment and perfect restoration of function take place although months or years may be required The treatment may be divided into three stages It is summarized by Makins as follows

1 During the period in which myositis ossificans is developing the treatment is complete rest

2 When the process has ceased and begun to consolidate massage and exercise is called for

3 When the process has come to a standstill for 6 months and there is functional disability sufficient to warrant surgical interference or when a large vessel or nerve is interfered with operative treatment is indicated The operation consists simply of the removal of bone through an appropriate incision

ABRIDGED RECORDS OF FIVE CASES SELECTED FROM THE EIGHTEEN OBSERVED IN THE MAYO CLINIC FROM 1910 TO 1923

CASE 1 (A419118) A man age 25 years came to the Clinic because of pain and swelling in the right arm When he was about 10 years old he had noticed that the right arm and shoulder were small and weaker than the left At the age of 12 he noticed a swelling in the right forearm which was especially painful if he bumped it At the age of 15 he began to notice a slight stiffness in the right elbow During the last few years the forearm had ached even when undisturbed There were no sensory disturbances although the right arm became cold from time to time

On examination a tumor involving the flexor muscles on the inner aspect of the forearm was found The tendons of the ring and little fingers were somewhat contracted The forearm could not be completely extended The Wasserman reaction was negative The X ray showed a dense tumor with multiple areas of calcification in the upper and inner aspect of the forearm

At operation the tumor was found to involve the flexor muscles of the forearm chiefly the flexor carpi ulnaris practically the entire belly of this muscle was taken up with the tumor The tumor when resectioned was found to consist of fibrous tissue cavernous spaces filled with blood and multiple scattered calcareous deposits

The pathological diagnosis was myositis ossificans Ten months later the condition was much the same there was still contracture of the ring and little finger and several hard and tender areas were present in the muscle bully (Fig 1)

CASE 2 (A119994) A boy age 17 years was hurt while playing football 2 months before coming to the Clinic but kept on playing He did not know the exact nature of the blow Swelling appeared in the thigh almost immediately then seemed to decrease in size for a time but recently had increased in size particularly during the last week There had been considerable pain at first but there was very little when he came to the Clinic

On examination diffuse swelling was evident over the lower half of the left thigh with some effusion into the knee joint There was no redness or tenderness and only very slight local heat The left thigh measured 5 centimeters more in circumference than the right The patient was unable completely to straighten the knee but it could be passively straightened The X ray revealed a well developed subperiosteal hæmatoma in the lower third of the left femur

After exploration the tumor was removed and a rubber dam drain inserted The left knee was aspirated The pathological report was myositis ossificans The patient's recovery was uninterrupted (Fig 2)

CASE 3 (X43004) A man age 50 was run over by a team 9 months before coming to the Clinic The accident resulted in dislocation of the hip which was set under an anæsthetic After 7 days he walked dragging the leg Since then he has always limped

On examination there was complete fixation of the hip joint in 30 degrees flexion with no real or apparent shortening The X ray showed myositis ossificans in the quadratus femoris (Fig 3)

CASE 4 (X112091) A woman age 21 years had had puerperal septicemia 2 years before coming to the Clinic Soon afterward she had noticed lumps in her neck these had remained more or less stationary for some time and then had increased rapidly in size

On examination a chain of small hard lumps like infected glands were found running down to the right under the clavicle and there were calcifying nodules along the biceps in the left arm Spasm of the left sternomastoid muscle was also noted The X ray revealed calcified cervical glands and marked calcification of the muscles around the lower and anterior aspect of the humerus

At operation a calcifying mass of the right cervical region probably myositis ossificans was found lying in the sternomastoid region It appeared to lie on each side of the sternomastoid muscle without actually involving it This mass was removed and the pathological report was myositis ossificans Three years later recurrence of the disease in the neck could not be detected but the condition was spreading in the arm (Figs 4 and 5)

CASE 5 (A452238) A woman age 34 years had been thrown from a rig 4 weeks before coming to the Clinic and had struck on the elbow which was dislocated backward It had been replaced under anaesthetic 10 hours after the injury Since then the movement of the elbow had been extremely limited There was no pain and no paralysis of the muscles The patient had had chiropractic treatment which increased the disability

On examination a mass in the front of the elbow was clearly felt to the inner side of the median line of the arm The mass was 6 centimeters long and 1 centimeter wide The range of movement was 45 degrees flexion and 12 degrees extension The X ray disclosed myositis ossificans in the brachialis anticus (Figs 6 and 8)

SUMMARY

Myositis ossificans is a comparatively rare disease It follows both open and closed trauma occurs after acute infections and spontaneously when there has been no history of infection or trauma

Myositis ossificans occurring in the quadriceps is often confused with sarcoma and differential diagnosis is important

The commonest sites of myositis ossificans are the quadriceps and the brachialis anticus The treatment in the early stages is rest and fixation If operative procedures are carried out in the early stages recurrence is practically certain Operation is only to be considered after 6 months and if distinct functional disability exists

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MENINGOCEREBRAL ADHESIONS

A Histological Study of the Results of Cerebral Incision and Cranioplasty

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THE desire to cure or prevent traumatic epilepsy has led neurological surgeons to employ a bewildering variety of implants into dural and cranial defects Dreyermann (4) has summarized these efforts at some length Widespread discussion of this problem particularly since the beginning of the war in 1914 has demonstrated great vagueness of thought as regard it underlying pathology Experimental investigations of the viability of various transplants are plentiful but careful histological studies are rare and studies of the process of wound healing in the brain still rarer The following communication deals particularly with the mechanism of adhesions changes in different types of neuroglia cells being ignored for the present

TECHNIQUE

One set of experiments was carried out on a series of dogs in the winter of 192 – 3 approximately as follows The lateral aspect of the cerebral cortex was exposed with aseptic precautions by turning down a large bone flap and excising the underlying dura A similar exposure was then made of the opposite cerebral cortex On the cortex of one side were placed a square of celluloid and a square of celloidin side by side held in place by a silk suture fastened to the margins of the dura A puncture wound was made into the brain between the squares and in some cases wounds were made so as to be covered by the squares

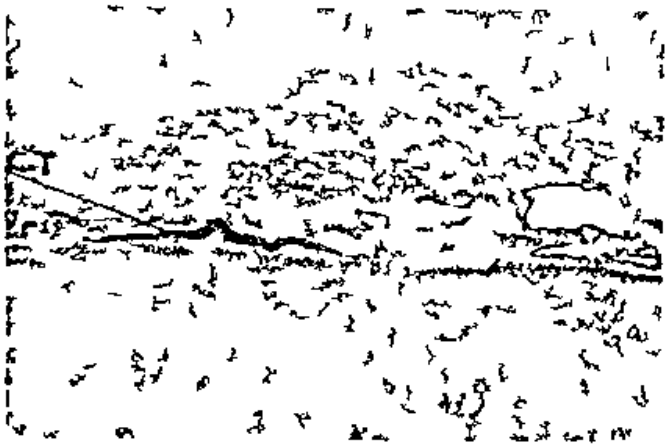
In the cortex of the opposite cerebral hemisphere a wound of loss of substance was made with a scalpel and squares of fat excised dura and fascia placed in order over the wound and held there as though on a clothe line by a silk suture fastened to dura in front and back A cuff of celloidin was folded about the margin of excised dura on one side or the other Both bone flaps were then replaced and each fixed to the skull by a silver wire bone suture or silk sutures in the periosteum In two of the ten animals in this series decompression openings only were made leaving the defect in the bone

In the following year these experiments were supplemented by a second series of dog Either a bone flap was made on one side and decompression done on the other or a bilateral decompression was done Stab wounds and implantations of strips of dura were made into the brain or grosser wounds of the cortex were made and covered with sheets of fascia or fascia and fat which were sutured into the dural defect Thus on most of the twenty animals used two separate operations were done each of which served as a control for the other

One animal died with an operative infection and one on the second day from postoperative hemorrhage In one there was leakage of cerebrospinal fluid and this one was sacrificed early The remaining 17 animals recovered perfectly after operation and were killed at different intervals up to 7 months by anæsthesia and perfusion of the carotid with 10 per cent formalin in normal saline solution

The method of postmortem examination is of importance If the skull cap be removed in the usual way or direct dissection be attempted it is well nigh impossible not to break adhesions between the brain and its covering After the above fixation a saw cut was made parallel to the tentorium and just above it and another slanting back and downward through the anterior part of the frontal lobes When these two cuts met a wedge shaped piece of skull and brain could be removed containing the field of both operations intact In the case of a decompression a deep incision was then carried around the rim of the bone defect so that a cylinder containing brain membranes and muscle could be removed without disturbing the relations of the structure The exact extent of ad

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F g E p im t Mall ry n r gl ta Lo git d l ect of th t ct f e t cular needle pas ed t th v tricl 7 m ths p u l / C necti t e i the tra t Empty pa d rar fed tiss l ed by a cond sat n f glia fibril

hesions could thus be seen in the gross and their nature studied in microscopic sections In the case of bone flaps the brain was usually dissected away from the under surface of the cranial vault until the bone flap was approached Then by gentle retraction the degree of adhesion and the nature of membranes between bone and brain could be made out and secured for section

The blocks of brain with undisturbed coverings were embedded and cut in celloidin for the



F g 3 Higher pow r ph t m c ograph f field drawn in F gu t h th o ti e ti sue c r d s nd g gl c le to



F g Exp me t Hæmat yl d V G so Bott m fl c t mad w th lpel 7 m nth p e ly Loo net k f t t th tra t d t ri g th bra



F 4 Case 9 M ll ry s ogha tain L ing f mpty tra t left by pa sag f m ll tric l eedl 7 m th b f e M mbra f gl fibril

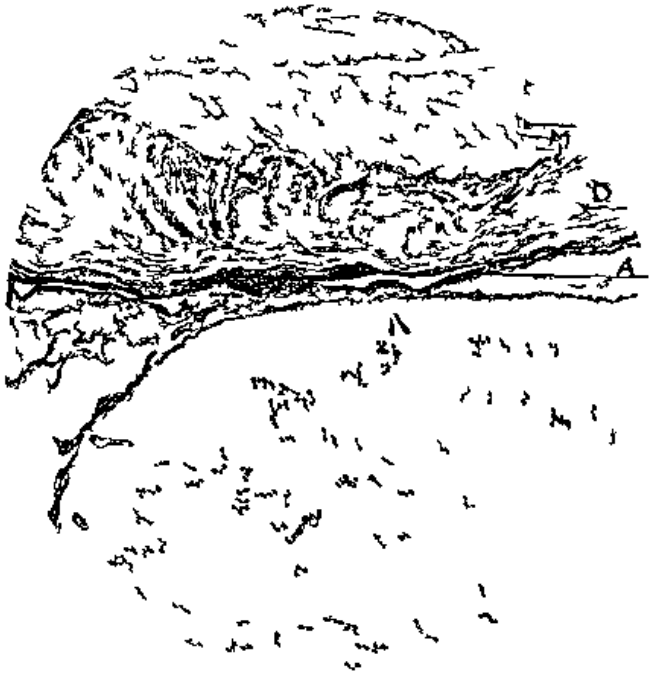


Fig. 5. Experiment 7. Hæmatoxylin and Van Gieson. The newly formed dura d 69 days after implede decomposition is free from any hæmatoxylin deposit.

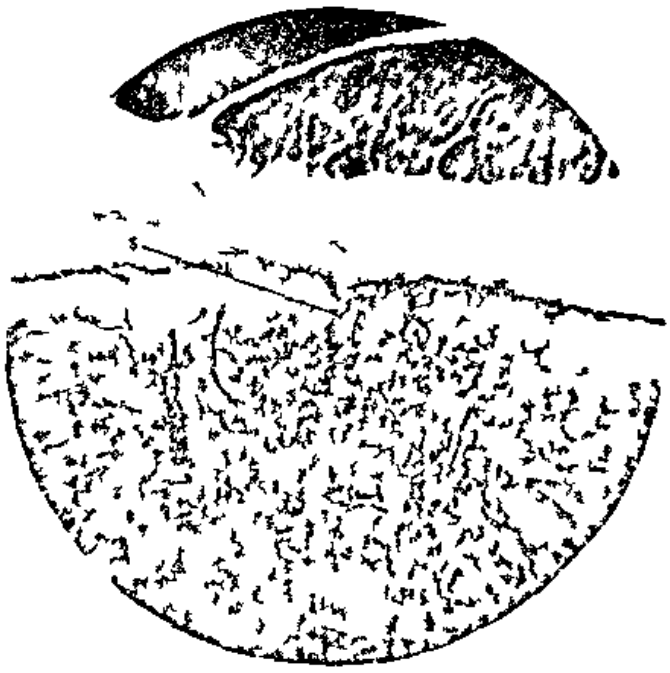


Fig. 7. Experiment 3. Cajal neuroglia method. Photomicrograph showing superficial glioses and adhesion about small tube.

most part. These sections were stained by Mallory's Phosphotungstic acid hæmatoxylin method for neuroglia, Nissl's method for nerve cells and Van Gieson and Mallory's methods for connective tissue. It was also found to be possible to cut good sized sections after freezing the properly fixed blocks. Thus blocks were fixed in a solution of 15 per cent neutralized formalin and 2 per cent ammonium bromide. After the length of fixation called for by the different methods sections were cut from each block and the block returned to the fixative. Thus sections of the same block were stained by a number of different methods

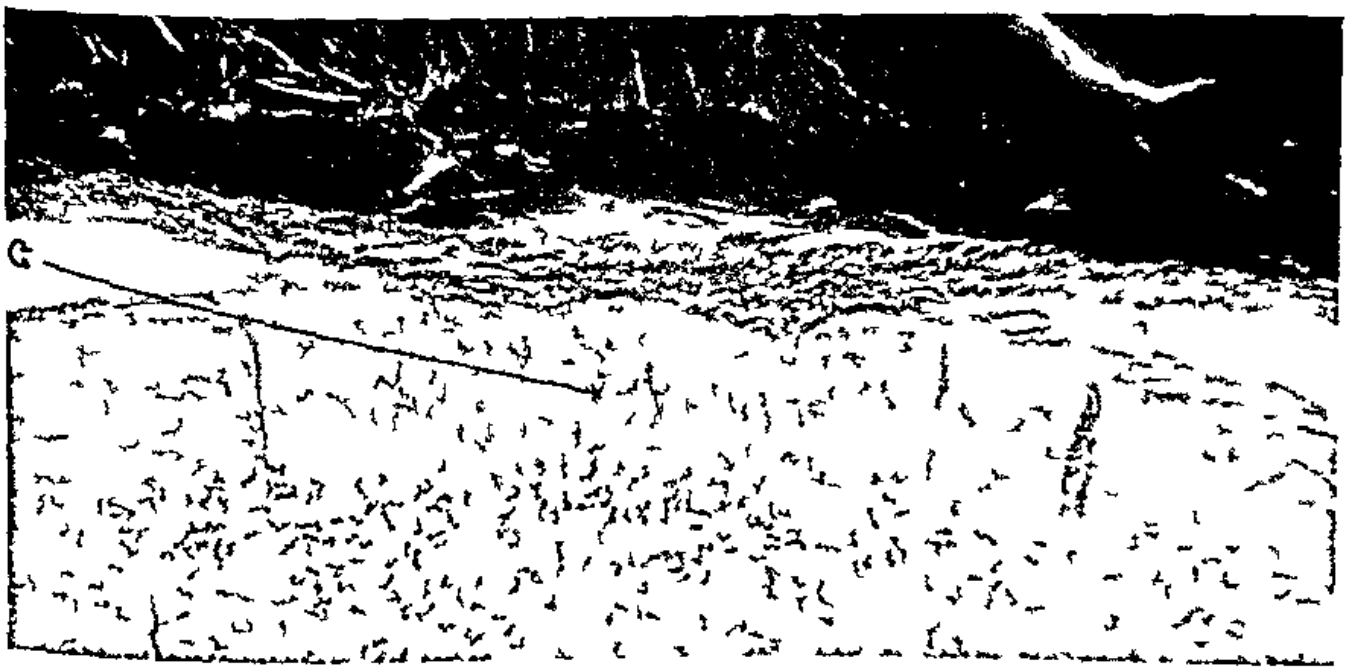


Fig. 6. Experiment 3. Hæmatoxylin and Van Gieson. Photomicrograph showing dura 92 days after decomposition with thrombosed vessels. Cerebral surface.



Fig 8 Experiment 1 Highpower photomicrograph of sam pe imen shown in figur Neuroglia Rio Hortega method

Cajal s gold sublimate method (1) for fibrous and protoplasmic neuroglia Rio Hortega s fourth variant of Achucarro tannin method for neuroglia (3) Rio Hortega s silver carbonate method (9 10) for microglia and for fibrous and protoplasmic glia It was possible to obtain sections from these blocks by the hematoxylin and Van Gieson method and specific methods for fat as well

BRAIN WOUND

Brain wounds do not heal in the sense of reproduction of parenchyma but certain progressive changes are observed Six days after the removal with a calpel of a small area of cerebral cortex fibroblasts and a few new vessels were to be seen in the blood clot *between the replaced bone flap and injured* area of brain There were also present numerous large round cells two to three times the diameter of a red blood cell (granule adipose cells or Gitterzellen) The cytoplasm of these cells contains many small round fat droplets as shown by specific fat stains Occasionally the vacuoles are large and then the nucleus which is typically near the cell membrane is apt to be flattened against it The cells may be seen at times on the outer sur

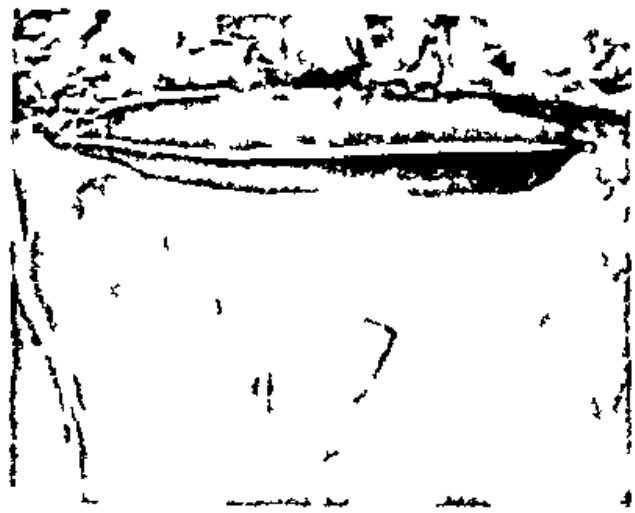


Fig 9 Experiment Hematoxylin and Van Gieson photomicrograph showing the connective tissue lopewhich formed about the periphery of blood plasma clot centrally Itemporary wound days before typsy The periphery of the clot has been removed in the sli

face of blood vessel walls laden with fat droplets Nineteen days after a similar wound the process of phagocytosis was going on actively and the nuclei constantly flattened against the cell periphery These phagocytes are in reality microglia cells in an ameboid form as demonstrated by the Spanish investigator Rio-Hortega After several months some wounds even deep ones as stab wounds contained none of these phagocytic cells if they may be called so while in other cases they continued to be plentiful even as long as a month after a simple incision

In addition to the formation over the surface of the brain of a new dura by fibroblastic proliferation fibroblasts were early found in brain wounds themselves forming a loose network at the site of injury from which the brain elements were disappearing (Fig 1) These connective tissue strands may be so sparsely scattered as to seem to be suspended *in fluid (Fig 2) Phagocytes may be present* and a few vessels At the surface such a network is continuous with the overlying dura In Case 18 stab wounds were made with a cannula the size of a small lumbar puncture needle into the parietal lobe and the bone flap replaced Four months after operation on lifting the skull from the brain thread like cores about 1 centimeter in length attached to the bone were withdrawn from the holes These fibrous threads (Fig 3) seem to have a loose structure

when seen through the microscope yet they are possessed of considerable tensile strength and thanks to their firm attachment to the overlying fibrous meninx must be capable of a considerable pull upon the brain tissue about the tract (Fig)

If a narrow strip of dura is freed leaving its base attached and if the free end is then buried in brain the condition at autopsy is found to be much the same except that the dura strip retains its compact formation unchanged and completely fills the tract Into rarefied areas along the tract a loose network of fibroblasts may be seen to pass from the implant

As early as the sixth week after an incision it is found to be bounded by a loosely interlacing layer of neuroglia fibril In Cases 9 and 10 7 months after incision there appeared a denser brush of neuroglia fibril surrounding the areas of loss of substance The deeper wound were sometimes found to be represented by empty tunnels In some cases the neuroglia fibrils formed a sort of superficial limiting membrane to the tunnel (Fig 4) in others the membrane was more diffuse (Fig 3) The cellular structure of the glia varied considerably The layer of fibril about the tracts of puncture wounds contained very few nuclei Beneath this in many areas could be seen marked neuroglia hypertrophy and hyperplasia

By means of differential stains for connective tissue and neuroglia it was shown that some of the wound tracts were free of connective tissue and were in fact empty while others contained loosely branching connective tissue which interlaced with a loose brushwork of glia fibrils

Changes in nerve cells were absent even close to a brain wound In some cases however evidences suggesting a destructive process were present even as late as the seventh month Phagocytes were present in the neuroglia brushwork and adjacent nerve cells showed some tendency to chromatolysis In experiment 11 five weeks after operation Nissl stains showed next to each stab wound the usual narrow zone of tissue which stained faintly In some section the cytoplasm of neurones near this area stained faintly although the position of the nuclei was normal In other sections there was frank chromatolysis some cells being swollen with nuclei at the periphery and cytoplasm opaque



Fig Experiment Hamatoxylin and Van Gieson Membrane in meshes of medium brush of cerebral cortex tract of puncture wound filled with blood pigment and phagocytes present 7 months after puncture

A deep brain wound does not heal in the sense of healing elsewhere in the body The neurones disappear about the injured area There is apparently a long continued phagocytosis Apparent condensation of neuroglia fibrils may take place and a cavity may result Along the tract of injury connective tissue usually extends from the surface where it is continuous with the connective tissue covering the brain

DURA REPAIR AND SUPERFICIAL ADHESIONS

Regrowth of a membrane resembling dura beneath a decompression opening has been demonstrated in recent experiments by Savad and Harvey (11) As those authors point out this has long been recognized by neurological

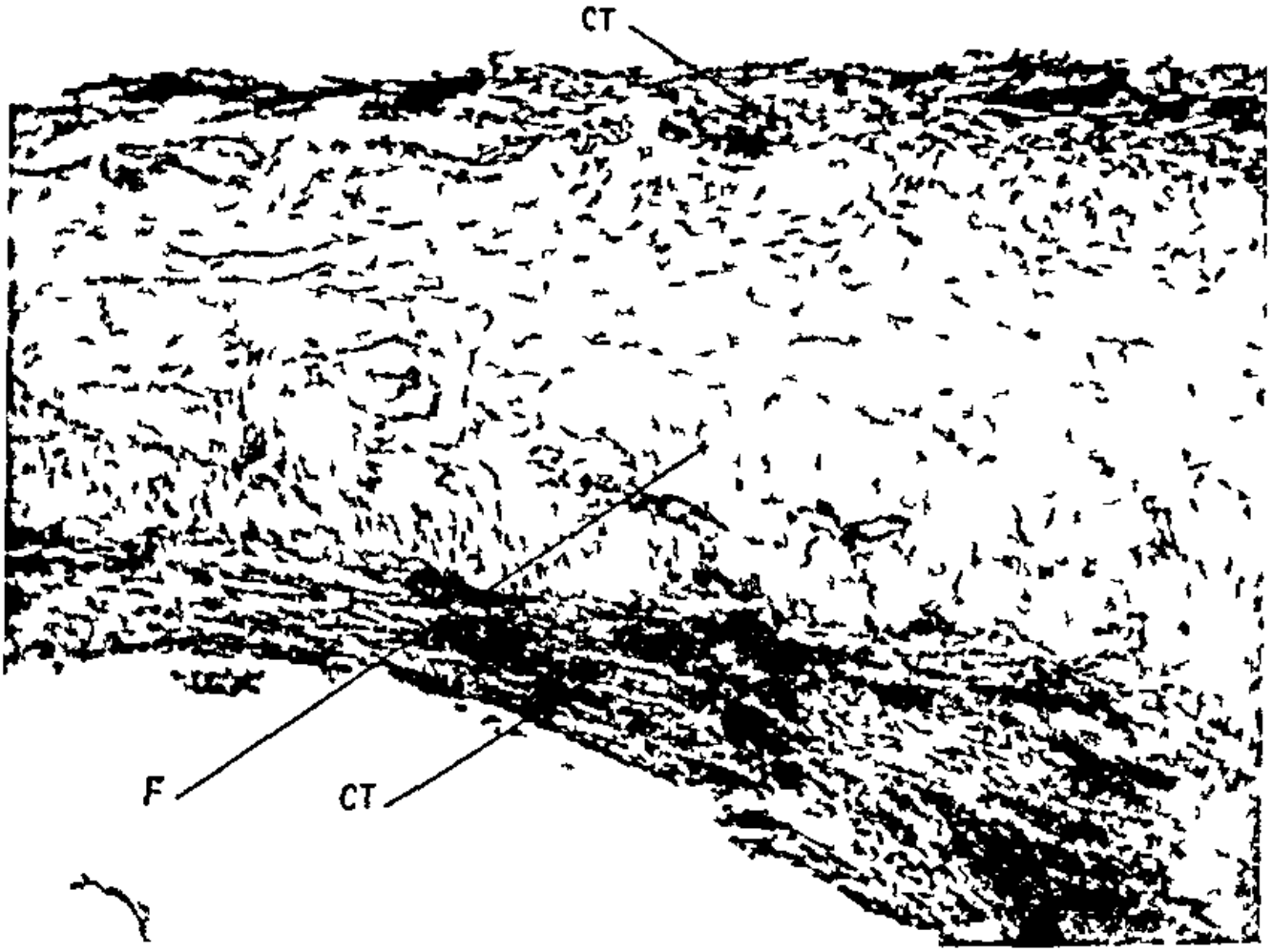


Fig 11 Experimental Harmetyl and Van Gieson bone flap Sixty days after operation fibrotic tissue Transplant of fascia lata surface fibrae beath lendy present both sides

surgeons The growth of the membrane is rapid It is not adherent to the underlying arachnoid (Fig 5) and the cells with which it lines the sub dural space resemble the arachnoid cells which line that cavity

When a bone flap operation is done the conditions are somewhat different In the first place vascularization must come from the side or beneath not from the covering Also the factor of movement is largely eliminated A membrane does form adherent to the bone flap and free from uninjured brain But it is much thinner than that which forms beneath the scalp and temporal muscle The sheet of tissue varies a good deal being thicker over a laceration and much thicker over a foreign body

If there has been injury to the brain adhesions form no matter what the covering If the injury is a gross one causing brain destruction the adhesions are composed of connective tissue strands entering the injured areas as described elsewhere in this communication Adhesions however may occur in the vicinity of larger injuries or at the site of a very small superficial injury The adhesion shown in Figure 6 corresponds to a circumscribed superficial gliosis (Fig 6 G) There is no evidence of actual wound Figure 7 shows a localized adhesion in the same case Here a glia increase can be seen to center about a small stab and about this area the dura is adherent Figure 8 shows the nature of the same adhesion more highly magnified The connective tissue is unstained The silver impregnation demonstrates the entrance of the neuroglia fibrils into the overlying connective tissue and throws light on the mechanism of adhesion

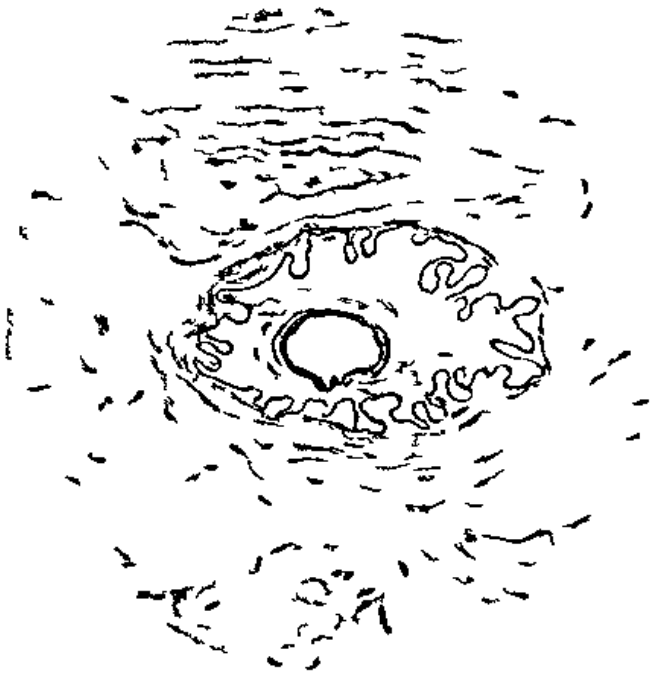


Fig 12 E periment 8 C n l at on of th mb ed artery n fascia which had b n tra plant l t the urf ce of the b ain f ur m ths bef a t psy



Fig 3 Exp im t 1 Hæmatoxylin and Van G n G wth f fibroblast be ath f t 6 d ys aft r i t h d b en tra spl nt d to urf e of l rai

THE BRAIN UNDER FOREIGN BODIES

When a sheet of celluloid or celloidin[1] was placed over the intact surface of the cerebral cortex no changes were observed in the underlying neurones nor was there any evidence of a diffuse alteration in the neuroglia In areas where the foreign body pressed upon brain as at an edge there resulted some thickening of the superficial layer of glia

There was a response to the presence of the foreign body on the surface of the brain however It was rapid and intense but mesodermal in character There formed a dense covering of connective tissue on all sides which at the end of four weeks offered firm resistance to section and later seemed as hard as cartilage (Fig 9) The connective tissue sheet opposed to each surface of celluloid was pearly white and glistening the external sheet being adherent to overlying bone in the case of a bone flap or to muscle in the case of a decompression The inner sheet seems to have left the arachnoid membrane intact although the pia arachnoid spaces may at times have appeared to be obliterated by pressure

[1] Th h b how b W C Cl k ( ) t b m g th l ta g of f g bod

When a thin sheet of celluloid or celloidin is placed over a fresh brain laceration there forms rapidly as described above a dense connective tissue covering The under covering (Fig 10) is continuous with the connective tissue strands which pass downward into the laceration to interlace eventually with the neuroglia brushwork The presence of the non absorbable foreign body over the wound does not seem to alter conditions except that two dense sheets of connective tissue like a bursal cavity are substituted for the one layer of such tissue which would otherwise overlie the wound and be adherent to it and the coverings above In the former case adhesion is direct between brain scar and skull or scalp In the second a cavity is interposed The reaction to celluloid seems to be about the same as to celloidin

THE BRAIN UNDER TRANSPLANTS

When fa cia lata fat or an excised piece of dura is transplanted to form the covering over a brain laceration there is rapid growth of new fibroblasts in the blood clot about the transplant and down toward the laceration There is as a result adhesion to the brain scar and to the overlying structure A dense layer of connective tissue results and in this layer can be recognized the fibres of the dura or fascia

transplant External and internal to the transplant new parallel fibroblastic layers are laid down tangential to the brain surface (Fig 11) The fascia lived to judge from the staining reaction of its cells and in several cases canalized arteries were found in the transplant (Fig 12)

In cases where the fascia was sutured to the edges of the dural defect the reaction was the same the transplant became adherent to overlying covering and was densely fixed to any underlying brain scar Such a transplant certainly does not prevent adhesions although in the absence of brain injury it may not form them

When fat was used as a transplant or a fat fascia sheet was sutured into the gap with fat next to the brain as is so ably recommended by Drevermann (4) and by many others the result was the same There rapidly formed new connective tissue all about the fat (Fig 13) The amount of fat seemed to decrease and in some cases of long standing none could be found remaining

SUMMARY

After a simple brain wound active phagocytosis continues over a long period and with it progressive disappearance of brain structure Neurones adjacent to such an area of rarefaction may show chromatolysis as late as seven months after operation Between normal brain structure and such rarefaction is found a brush work of neuroglia cell and sometimes a limiting layer of neuroglia fibrils In the cavity is found a loose connective tissue network

Deep adhesions are composed of connective tissue threads attached to dura or its substitute and to the glia brushwork at the bottom of the brain wound Superficial adhesions result from slight injury and extend some little distance over the surface of the brain from the point injured These adhesions are composed of an interlacement of connective tissue fibril from the dura with the fibril of a superficial gliosis

The thickness of the new or adventitious dura formed after removal of the old varies according to the available blood supply Movement and foreign bodies are also factors to be considered The dura is thick after a decompression operation and thin beneath a bone flap It is thicker over a brain laceration

Placement of the least irritating foreign bodies as celloidin on the surface of the brain causes a very thick hard connective tissue envelope to form all about it The results are the same even when there is no wound of brain and when the foreign body lies beneath a relatively non vascular bone flap The layers of this envelope form a bursa like cavity preventing direct adhesion to the scalp or skull Adhesion between brain wound and lower layer of the envelope forms of course as well as adhesion between upper layer and skull or scalp

Transplantation of various tissues to the surface of the brain is followed by rapid growth of a layer of fibroblasts above and beneath the transplant Such procedures are useless if their purpose is to prevent adhesions for fibroblasts grow wherever the conditions are suitable as do organisms in a contaminated wound Thus the transplant is incorporated in the adhesion of brain to its covering

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FIBROSARCOMA OF THE TRANSVERSE COLON

By FRED W RANKIN M D F A C S AND J C CRAGER M D Lexington Kentucky
From the Surgical Clinic

THE diagnosis of intestinal sarcoma of whatever variety is rarely definitely made but usually is discovered at autopsy or during an operative procedure for some other condition The rarity of such a condition is well illustrated by the fact that out of a series of over 13 000 autopsies performed at Prague over a period of 15 years only 13 cases of intestinal sarcoma were found By the location in the intestine found in this series it is obvious that with the exception of the rectum the large bowel is exceedingly rarely invaded The small bowel too is not the site of frequent occurrence but here the picture which is usually that of lymphosarcoma is much more frequently observed Lymphosarcoma of the small bowel has been reported in the literature about 250 times and quite recently we have had 2 patients with this condition in one of whom the malignant process had invaded the ileocæcal valve and the mucosa of the caput cæcum itself The locations in the intestines in order of frequency are ileum jejunum ileocæcal valve and duodenojejunal angle rectum sigmoid cæcum hepatic flexure transverse colon and splenic flexure

It will be observed that the splenic flexure is rarely the site of malignant invasion by sarcoma and indeed carcinomatous invasion of this segment of the colon is less frequently found than in any other division It is inaccessible to surgery which makes this fact more readily appreciated although its lymphatic supply which according to Madelung is scarce renders it a less liable site for recurrences

Histologically lymphosarcoma originating in the lymphatics is most frequently found in the small bowel This tumor begins in the submucous lymphatic glands grows along the long axis of the bowel wall and early involves the muscular layers thus permitting a dilatation of the bowel lumen because of the muscular paralysis

Keen notes that intestinal dilatation is a feature of especial interest though not a constant phenomenon in lymphosarcoma occurring in the small intestine In the large intestine the type of sarcoma most frequently found in the rectum which is the favorite site of this type of pathological growth is melanotic and here as elsewhere pigmented malignant tumors metastasize early and are unfavorable in their prognosis Primary pigmented tumors anywhere in the intestines are rare Vandervert and Kellert have observed that they are most often secondary deposits According to Ewing the great majority of sarcomata in any division of the bowel large or small are of lymphomatous type although a considerable number are of the fibroblastic spindle cell type located in the muscular layer external to an intact mucosa

The clinical course of patients in whom intestinal sarcoma is found offers little that may be considered of real diagnostic aid as to their preoperative nature It is that of almost all chronic gastrointestinal diseases to which in the later stages are added the characteristic features of malignant cachexia The symptoms differ from those caused by carcinoma in corresponding locations in few details When it occurs early obstruction is the most frequent symptom probably which causes patients with gastrointestinal malignancy to seek aid and it occurs more slowly and with less frequency in sarcoma than in carcinoma This is explained by the type of the growth its usual point of beginning and the absence of necessary mechanics to produce intestinal obstruction in the early stage Sarcoma of any type tends to produce either elongated masses parallel to the intestinal segments or spherical growths with dilatation When obstruction occurs it is not usually due to a constricting action of a cylinder growth as is the case in carcinoma but to one or more of three conditions namely invagination di

rect pressure from enlarged lymphatic glands or intussusception Invagination is a rare cause of obstruction Pressure from the enlarged lymphatic glands usually is compensated for by a dilatation of the proximal segment Intussusception is found more often than would be suspected In 1914 Speese reported 74 cases of resection of the small bowel for sarcoma in 14 of which the complication of intussusception was noted This is approximately 19 per cent and differs somewhat from Cassemeyer's statistics which show this complication in 26 out of 284 cases or slightly over 9 per cent The mechanism of this frequently is a polypoid growth in the lumen of the intestines which is carried along by the normal peristalsis or it may be due to the normal gut being telescoped into the dilated sarcoma portion *It has long been an* axiom that sarcoma occurs more frequently in young individuals than carcinoma and Keen warns that in intestinal tumors in *patients under 15 years of age one should* always think of sarcoma over 40 years of age of carcinoma In Libman's series the age incidence ranged from 5 days to 70 years Albion collected 10 cases in children Comparing this total with the entire result of intestinal sarcoma that Goldstein was able to find in the literature it is readily seen that nearly 7 per cent occur in children

This percentage however can be considerably augmented if the number of cases occurring in young adults is added to it Another point of differentiation which has been emphasized by some authors is the presence of a large rapidly growing intestinal tumor or several tumors in the intestine which is considered most indicative of the sarcomatous type In reviewing the reported cases it is found that in 100 instances every segment of the gastro intestinal tract was found involved

Intestinal tuberculosis particularly of the hyperplastic type which occurs so frequently in young adults must always be differentiated from malignancy Occurring as it most frequently does close to the ileocæcal valve and presenting early many of the symptoms of cachexia it is not without some difficulty that its true nature is demonstrated In neither of the conditions is the X ray of so much value as in the more frequently ulcerating carcinomatous growths Malignant tumors of the colon particularly in its transverse segment have a tendency to metastasize not only into the neighboring lymph glands but also into the adjacent omentum and occasionally the primary growths develop in the omentum itself Aimes in a review of omental tumors found 53 primary sarcomata of this origin The symptomatology of the tumor itself obviously is the same whether primary or secondary and the principal observations brought out with reference to omental sarcoma are that they occur as a rule *in young subjects that the mass is unusually* large that the tumors are vascular friable and hæmorrhagic—operation usually is difficult that adhesions are formed early that cystic degeneration is a frequent accompaniment (cystic degeneration is found so frequently indeed that occasionally sarcomata *are described as myxomatous growths or some* other type of cyst) that omental sarcomata frequently are pedunculated and have been found in hernial sacs that ascites is present usually in about one case in four and usually but not always hæmorrhagic and that the primary sarcomata nearly always are found to be single the secondary ones are *usually* multiple

While all the cellular varieties have been encountered the spindle cell growths constitute about 50 per cent of the total number In the early formation of the growths either primary or secondary no symptoms are produced but once the tumor becomes widespread in the omentum grave disorders arrive readily Gastric disturbances then are nearly constant and ascites usually is abundant Partial intestinal obstruction œdema of the lower extremities pain and other signs of compression occur in rapid sequence Dyspnœa ensues as the mass becomes progressively larger and death occurs either from pressure or from general sarcomatosis The early diagnosis of the condition is difficult but a flat palpable tumor at the level of the umbilicus or more frequently a little to the left is a helpful finding The mass usually is felt just beneath the abdominal wall *Before*



I (left) Low p v pl t m g th h that th fb a omat u at e f th g v th in thi ct n s typ l l d e no deta l d de pt n f t l t l g cal n tu e The pu p ef ep l i g t t h the rather d tinct b da y m in ng g th al t th m co a ill t ati g th te de y f th t m t g a ay from th lumen f the b v l ath tha t t

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adhesions are formed it is freely movable from below upward moderately from side to side and least of all from above downward In the b ginning it moves slightly with res piration In our own case the tumor in the omentum was unquestionably secondary but the adhesions which took place early between the omentum and a fibroid which it overlay and between the omentum and the periton eum while characteristic of this type of growth did not lead us to the suspected diagno is There was no œdema of the ex tremities in our case nor was there any con stipation a fact which is explained by the absence of encroachment on the lumen of the bowel by the primary growth and al o by the fact that it the omental tumor which extended from the dilated transver e colon to the fibroid below acted as a bridge becau e of its adhesion to the abdominal wall and thu re moved pre sure from the remainder of the intestinal tract

TREATMENT

In the case appended the diagno i of a large uterine fibroid with ome pelvic in flammatory disea e complicating it cau ed u to undertake the operation There had been no symptoms referable to the ga tro intestinal tract which led us in any way to suspect malignancy It was noted that the fibroid apparently was attached to the anterior abdominal wall but the pelvic inflammation was felt to be a satisfactory explanation of this fact It was not until a large pedunculat ed fibroid the size of a 6 months pregnancy had been removed that the omental tumor was found and exploration for the primary growth revealed it in the tran ver e colon The removal of this segment of the large bowel despite its mobility and its ease of access is not so successfully carried out as that of some of its fellow divisions for several reasons The blood supply which come from the middle colic ves el is plentiful and is distributed throu h furly con tant arcs and is so large that accidental injury to the main ve sel during the cour e of a urgical procedure upon adjacent vis era i followed by gangrene in a very small percentage of ca es The protection which i afforded by the wrapping of the omentum around the colon in the e accidental injuries *may* ex plain thi in a large measure but in dealing with malignancy and resection of the colon one mu t sacrifice the omentum a well for fear of implantations To re establish the lumen of the bowel either by axial or late al

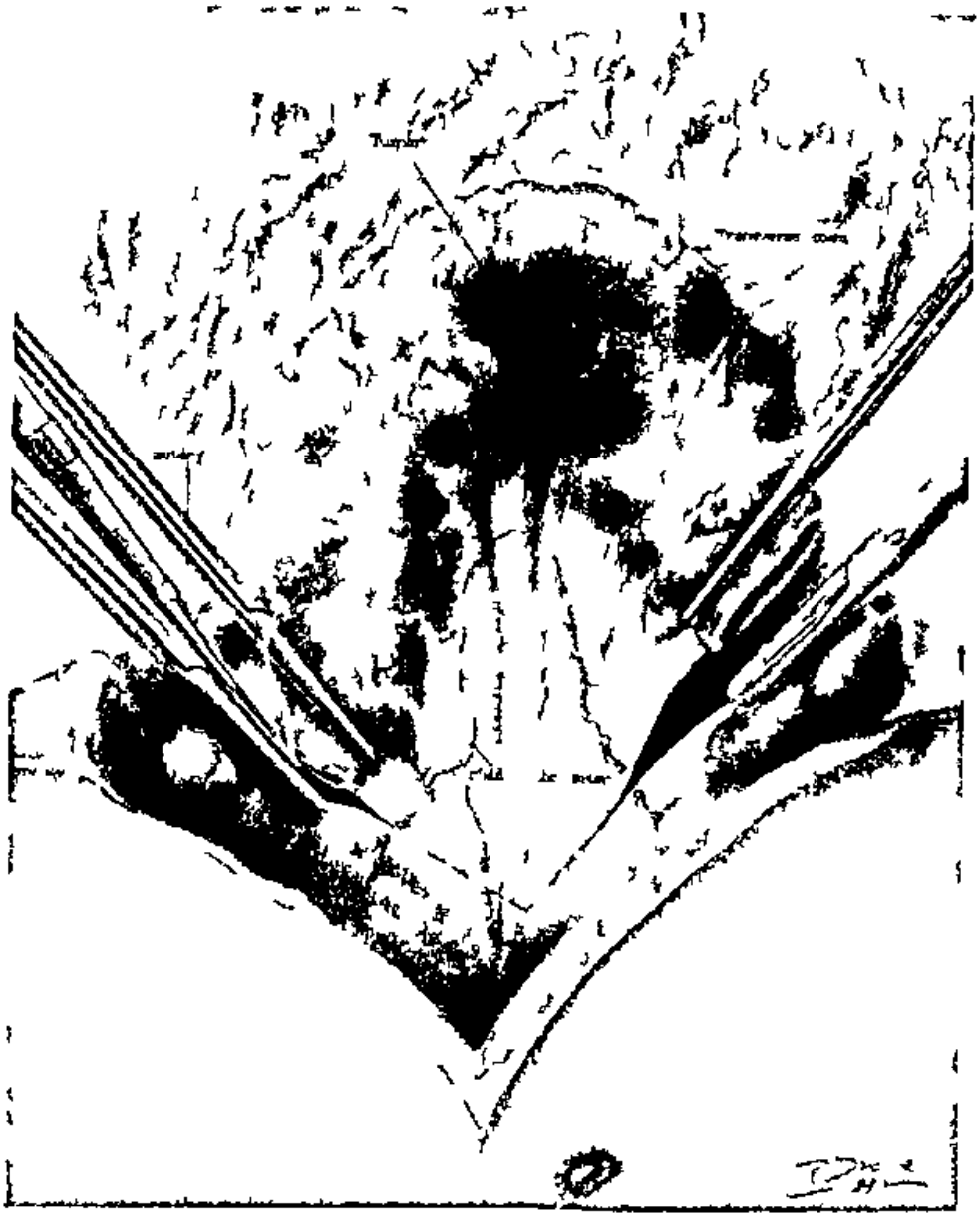


Fig. 3.—Transverse colon reflected downward with the mesentery of the transverse colon and the gastrocolic omentum divided between clamps. The middle colic artery can be seen passing to the transverse colon.

anastomosis in the one stage is not without considerable liability to leakage. The mobilization of the transverse colon is a simple technical procedure because it is swung from two points of suspension, namely, the less mobile hepatic and splenic flexures which are readily explored. The lymphatic supply of this colonic division is particularly large, however, there being a chain of lymphatics not only in the mesentery of the omentum but also in the gastrocolic omentum and directly into the great omentum. This same chain of glands between the stomach and transverse colon which is so readily invaded by malignancy from the stomach itself is early the site of metastasis in colonic cancer. The glands in the great omentum while early invaded are more readily and easily removed with that organ itself. A complete operation which will insure a reasonable percentage of 5 year cures and at the same time be well within the mortality limits which are considered justifiable must take into consideration a gland dissection. The restoration of the continuity of the bowel while easy of accomplishment by end-to-end anastomosis in most cases is followed by a high mortality because of the leakage of the suture

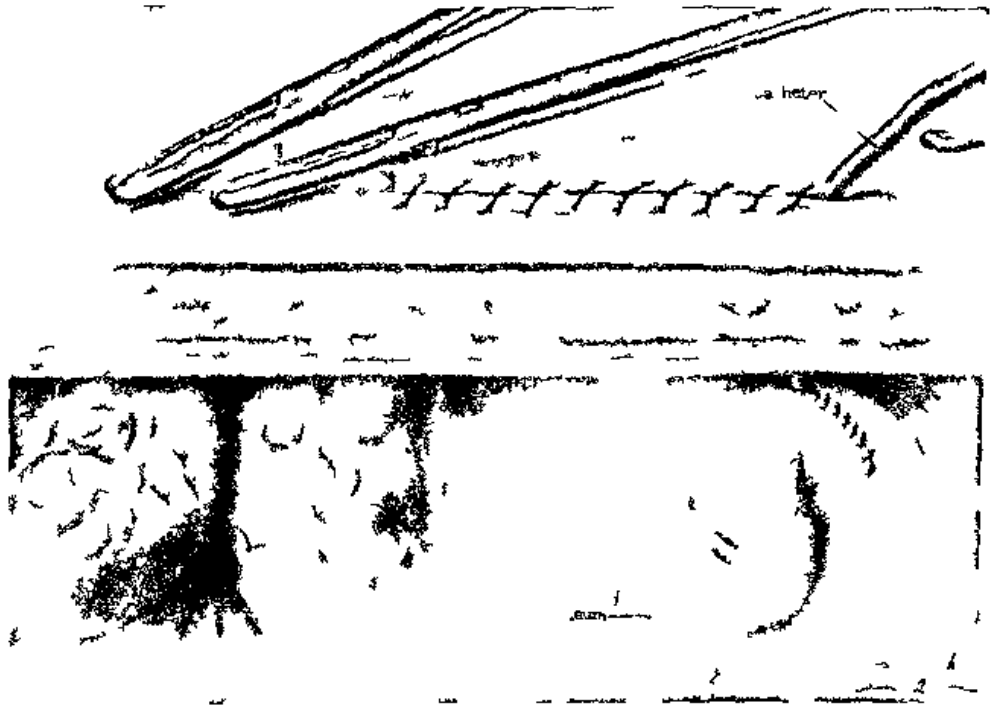


Fig 4 Stumps of the excluded bowel brought out of upper left flank with the ileostomy of the lower ileum

line due to faulty nutrition Lateral anastomosis is usually not feasible because of lack of bowel substance and in the hands of many operators has been abandoned for various other reasons The Mikulicz procedure is satisfactory from the standpoint of immediate mortality and yet the slow convalescence from this operation coupled with not infrequent recurrences both in the abdominal wall and the lumen of the bowel precludes its acceptance as the ideal procedure Unless one ligates the blood supply and thus removes the gland bearing area in the mesocolon in carrying out a Mikulicz operation the chances of recurrence later are greatly increased On the other hand if one does ligate the blood supply the local condition which confronts him at the end of 72 hours is not always acceptable Bowel which is brought out of the abdominal cavity after having its blood supply ligated soon has a tendency to become thickened œdematous and in many instances necrotic The omentum must be resected if the transverse colon is brought out in this type of operation Just epiploic appendages and fat tags in other segments must be sacrificed to prevent the entire extraperitoneal mass from becoming foul smelling and necrotic In some patients who are anæmic and whose tissues have a retarded power of repair the cutting off of the extra abdominal loop of bowel is followed occasionally by a peritonitis

The mortality then in all types of operation which formerly was as high as 50 per cent but which under modern technique has been reduced to approximately 10 per cent will not be found to be decreased with a Mikulicz operation unless some other procedure in addition is adopted We have tried the application of two stages of this procedure in one doing the operation between clamps removing the bowel segment with a cautery and leaving the bowel at the site of operation obstructed for a number of days Supplementing this type of retention with an ileostomy about 16 inches from the ileocæcal coil is a valuable adjunct toward reducing the untoward postoperative symptom by draining the toxic products of the small bowel The steps of the operation are simple and quickly accomplished The mobilization of the transverse colon is made by first selecting two points one on either side at which the bowel is to be divided later As much of the omentum as possible and generally all of it if it is invaded

should be sacrificed In dividing the omentum care should be taken that small bites are caught in the artery forceps and that numerous points of ligation are made This obviates the danger of subsequent necrosis and embolism The colon should be freed from the omental attachment to the stomach in the same way The blood supply in the transverse mesocolon is now ligated close to the root of the mesentery every precaution being exercised to preserve the arcs supplying the ends of the bowel to be left The bowel with the omentum should be removed with the cautery This has the advantage of a complete gland dissection and obviates the danger of contamination at the time of primary operation The heavy clamps which hold the end of the bowel are held at the upper end of the wound and a few interrupted catgut stitches join the peritoneal coats of the two arms of the colon precisely as in the original Mikulicz procedure An ileostomy is made after the Witzel technique and the tube permitted to emerge from the lower angle of the wound or from a stab wound in the flank One or two sutures are sufficient to hold the bowel attached to the peritoneum The clamps should be left on at least 72 hours and better 96 hours On their removal necrosis will be found to have taken place on the line of division and frequently slightly below it but not into the peritoneal cavity There is no danger of necrosis far back along the bowel walls because one can be sure not to sacrifice blood supply too far back to permit healthy bowel being in approximation with the peritoneum The other steps of the operation can be carried out as in the original Mikulicz procedure but I believe may be undertaken earlier if there are no untoward symptoms This method seems to have the distinct advantage of permitting a gland dissection and at the same time an aseptic removal of the bowel without danger of sloughing at the divided ends and the production of a subsequent peritonitis It is a graded procedure however which requires time for its completion This should not be considered a formidable disadvantage however if the extirpation of the malignancy can be done in a radical way with a lowered mortality

THE TIME ELEMENT

The time element within very elastic limits is a negligible feature in the treatment of malignancy if the end result is satisfactory On the other hand graded operations which necessitate a long convalescence and which ultimately fail to prolong life are *not* satisfactory

The appended case illustrates largely the technical points mentioned and is of interest because of the extreme rarity of the pathological type of the tumor as well as its anatomical location

M B age 41 married occupation laundry maid

Patient entered hospital 4 years previously with same complaint as at present (except omitting) but had not been operated upon

She complained chiefly of tumor in the abdomen with pain She had vomited frequently for weeks previous to admission One sister had epilepsy family history otherwise negative Patient's general health had been good until he noticed the appearance of the abdominal tumor 4 years ago She had had the usual childhood diseases with uneventful recoveries i e measles mumps and hooping cough Malaria and pneumonia in fact childhood no recurrences since She has had frequent headache occasional vertigo of a transient nature epistaxis for past 4 years once each week—at times bleeds so much that she was forced to bed on account of weakness Mouth and throat examination negative Cardiorespiratory system negative Gastrointestinal tract negative up to 2 weeks ago Since that time whenever patient ate or drank anything she would be able to make a hot feeling in stomach *and would then be nauseated and vomit* Mild vomiting she could feel perfectly well No blood was found in emitus The bowels moved regularly and purgatives were seldom used No malena Patient urinated once each night and suffered moderate frequency and burning on urination in day Menstruation began at age of 14 and was *normal until the patient was 37 years old* at which time it stopped spontaneously Almost 4 years later 7 months before last admission patient fell from vaginal profusely for 3 days This bleeding ceased without treatment and there have been no recurrences since It is not married Last age for was and has had one pregnancy with normal delivery *She has had no recurrences* She has had a slight leucorrheal discharge for past 5 years Examination of nervous system negative except that patient has had full use of understanding concerning her condition for the past 6 months Patient's weight as recorded upon She says that she has lost considerable weight in the past year She did not know how much and her appearance was not that of cachectic

About 4 years ago patient felt a mass in her lower abdomen It seemed to change its position when she would sit low n and l ri e and it frequently caused a bearing do n sen ation This mass has enlarged gradually since that time Shortly after its appear ance her menses stopped Patient has been able to work constantly until 3 weeks before admi ion at which time the heavines in her abdomen wore her out As stated above she vomite l frequently during the 2 weeks before entering th ho pit l

Physical examination and pre operative diagnosis Patient i a well develope l and nourished negro female 41 year old l with clear mind normal skin and no œdema The head is negative except for moderate oral sepsi The neck i negative The che t i symmetrical showing slight depre ion in both infraclavicular regions no lagging on re pira tion Voice sounds and breath sounds are normal no rales hear l Th heart i normal in size an l position sounds are li tinct no murmur The abdomen bulges as in pregnancy The tumor ma is smooth except to the left of the umbil cus where it feel as if it were adherent to the abdominal wall Dull ess exten ds from pubis to three finger breadth below xyphoid cartilage and well to both si les No ma es could be fe t that did not seem continuou with the main tumor No areas of tenderness could be made out The extremities are normal ith o œdema Th vaginal out et i marital in typ Bartholin s an l Skene s glan ls are ne ative The perineal floor is in good conditi n The cer ix i hrm and a p nkish secretion exudes from the ex ternal os Bimanual examination re eals a ma s extend ng up from the uterus nd ontinu us with it It is apparently the same mas as as made out on examination of the ab lomen

Rectal examination i negative except for the same mas

Laboratory data Urin is amber color turbid specif c gravity 024 albumin and ugar negative acetone negativ Micro copic examination sho s a f w epithelial and pus cells no asts Blood count shows white blood cell 7 400 red blood cell 4 00 000 hæmoglobin 7 per cent

Pre-operative diagnosis Fibromyoma of ut rus with adhesi ns from pelvic peritoniti

Op ration and findings A mid line incision was made The peritoneum was found adherent to a large tumor The pe toneal cavity was entered with diff culty The tumor mas con ted of a larg pelvic growth over hi h as adherent the great m ntum hich also contained multiple tumo s of various size having a dark re i meaty appea an e The omentum wh ch was e ery here inject d with large thin walled blood vessel was separate l from the pelvic tumor Thi was a pedunculated fibr i about the ize of a 5 months pr gnancy and a attached to the fundus of th uterus a l ttle to the right of the m d line It was removed by divid ng the talk between lamps Th ut rus appeared normal adnexa normal The omentum with it tumors as then separated from the abdominal wall from below upward In th upper abdomen a malignant tumor was encountered involving the mid lle third of the tran verse colon The patient was in good condition so that immediat re ection was decided on Clamps were left on the two ends of the bowel after sterilizing the cut lines with a hot iron These end were then brought out on the abdominal wall and the wound closed around them This completed the first two stages of the Mikulicz operation Before closing the abdominal incision an ileostomy tube was in erted close to the ileo cæcal valve and brought out at the lower end of the wound

The specimen removed consi ts of (1) the tumor removed from the uterus a reddi h grav boggy muscular mass almost spherical in outline measur ing 18 by 15 by 14 centimeter The cut surface is pale yellowish gray with projecting masses varying from cm to 10 cm in diameter Other portion contained cysts averaging about 30 millimeters in diameter containing a brow ni h grav fluid (2) Th larg ntestine are 18 centimeters in length 4 centim ters across lumen wall averaging 2 centi meters n thickness It i reddi h gray and contain firm masses varying from 10 to 40 millimeters in diameter wh ch tend to encircle the entire lumen of the bow l Cut urface through the masse reveal in ome a semi olid fluid resembling a recent blood clot The lumen of the bo vel i larger than normal (3) The omentum 14 by 10 by 8 centimeters contains a mas 6 centimeters in diameter in the center of the specimen The cut surface pre ents a pale gray to yello i h gray striated appearance Mu h blood flo s from the cut surface Other m sses 40 by 74 by 10 millimeters to 30 by 12 by 8 mill met rs are found in omentum detached from but similar to above

Micro opic diagnosi (1) leiomyoma (pedun culated tumor removed from uterus) ( ) and (3) fibrosarcoma of colon and omentum A typical s ction from the last t o is sho vn in illustration

Fo toperat ie convalescence At the end of 96 hours the clamps we e removed from the end of the bowel During this time the patient had not vomited an l had not con plained of abdominal di comfort She had been kept under the influence of a narcotic and fluids had b en administered to her subcutan eously in the amount of 4 000 to 5 000 cubic centi meters every 24 hours The condition was good Heavy clamps were put into the lumen of the bowel and the spur cut out bet ween the two segments the operation being compl ted according to the usual Mikulicz pr cedure

A i s P g è méd 9 Ja 4
Li i c N pl t Di e Ph l d lph W B Sau ders 9
Gold tein Am J S g 9
Keen s Su ger Ph l d lph W B S nd 9 9
Vande Ve r d K r N Yo k St M J 9 7

DEPARTMENT OF TECHNIQUE

CANCER OF THE PROSTATE TREATED BY PERINEAL PROSTATOMY WITH THERMO-ELECTRIC COAGULATION

By B C CORBUS M D F A C S and V J O CONOR M D Chic ago

CANCER of the prostate is a fairly common disease and according to statistics occurs in from 15 5 per cent (Mayo Clinic) to 21 per cent (H H Young) of all cases in which obstruction occurs at the bladder neck

As physicians become better trained and more skilled in urological diagnosis it is highly probable that this serious affliction will be diagnosed earlier and in turn receive more rational treatment It is not our purpose to enter into controversy with those who have had more experience in the various methods of treating this almost incurable disease but rather to present a method for eradicating the malignancy without destroying the anatomical relations between the cancer and the prostatic capsule

ANATOMICAL CONSIDERATIONS

According to Quinby the apex of the prostate is supported by the deep layer of the triangular ligament On each side is found the so-called lateral aponeurosis of the prostate This runs from the descending ramus of the pubis backward to join the rectum and by it the prostate is separated from the median margins of the levator ani muscle It is closely applied to the sides of the gland and is united to it by the cellular tissue containing the vesical plexus of veins

Behind the prostate separating it and the seminal vesicles from the rectum there is a transverse aponeurosis known commonly as the fascia of Denonvilliers This layer is attached below and anteriorly to the apex of the prostate and triangular ligament and united above to the peritoneum which descends between the bladder and the rectum This last union is as marked as though there existed continuity of tissue and explains the constancy of the rectovesical cul-de sac (Douglas fossa) On each side this fascia is attached to the lateral aponeurosis described above By its posterior surface it is but loosely attached to the seminal vesicles and to the true capsule of the prostate gland The texture of this membranous layer is said to resemble that of the dartos All these surrounding prostatic fasciæ make up the prostatic bed and these serve to control the direction and spread not only of suppuration but also of malignancy in this area Besides these aponeuroses described above the prostate has a true capsule *of its own which sends prolongations be*tween the glandular lobes

From the pioneer work of Lowsley we are informed that cancer of the prostate develops primarily in the posterior lobe and when the lateral and median lobes are involved this occurs secondarily from an extension of the process in the posterior lobe

According to Young carcinoma of the prostate develops many times where hypertrophy is absent in both median and lateral lobes the growth following planes of least resistance continues upward beneath the trigone toward the seminal vesicles and does not easily break through the capsules which surround the lateral and median lobe

The mucosa and submucosa of both urethra and bladder are very resistant to invasion and the constriction in the prostatic urethra often encountered during examination is due primarily to the crowding of the cancerous tissue up against the urethra and not to direct extension of the growth

Cancer of the prostate may be of slow growth and remain for a long period well confined within the capsule of the prostate Several years may undoubtedly elapse before periprostatic structures seminal vesicles and trigone are greatly involved Intravesical tumor growth is extremely rare and occurs only very late in the disease and even then in a small percentage of all cases

From the best authorities it is generally understood that the disease apparently remains well encapsulated for a fairly long period Unfortunately on account of its obscure position and often indefinable symptoms its diagnosis is lamentably delayed

From the foregoing and from a careful review of the anatomy of the prostate we must look upon the prostatic capsules as anatomical barriers against the spread of the disease anteriorly and laterally Since the rectum is so easily separated from the dense fascia which locks the cancer securely in its bed it seems that the most rational method of attack is by the way of the perineum for with proper exposure the cancerous tissue is brought directly beneath the finger without disturbing or in any way spreading the smoldering malignancy

SYMPTOMS AND DIAGNOSIS

The symptomatology of cancer of the prostate is almost identical with that of benign hypertrophy

Pain in the penis and perineum may be the first symptom noted but as a rule this is associated with frequency of urination and difficulty of urination often accompanied with more or less urgency

As the prostatic urethra does not as a rule become involved in the cancerous process hæmaturia is not a necessary cardinal symptom unless associated with benign hypertrophy

Too little attention is given to the symptom pain It may be vague and very indefinite in the back or referred to the sciatic notch testicle inguinal region thighs or legs In arriving at a diagnosis every referred symptom should be carefully noted and regarded with suspicion These are the cases which so frequently go without positive diagnosis for a long time and in many instances are subjected to futile manipulative therapy before the correct diagnosis is made

Rectal examination It is only by careful routine rectal examination that the diagnosis of early carcinomatous involvement of the prostate can be diagnosed whereas it helps us comparatively little in the benign hypertrophy it usually establishes the diagnosis in malignant disease of the prostate

There is nothing so characteristic as the stony hard feeling so easily palpated by rectal examination The involved portions of the gland are usually firmly fixed due to periprostatic inflammation The cancer area is as a rule rough and nodular and can be sharply demarcated from the surrounding healthy tissue

In passing a catheter or cystoscope one is often impressed with a tightness in the posterior urethra This constriction may be so narrow that the passage of any diagnostic instrument is not possible until the prostatic urethra has been dilated No examination should be completed without a satisfactory cystoscopic examination and while

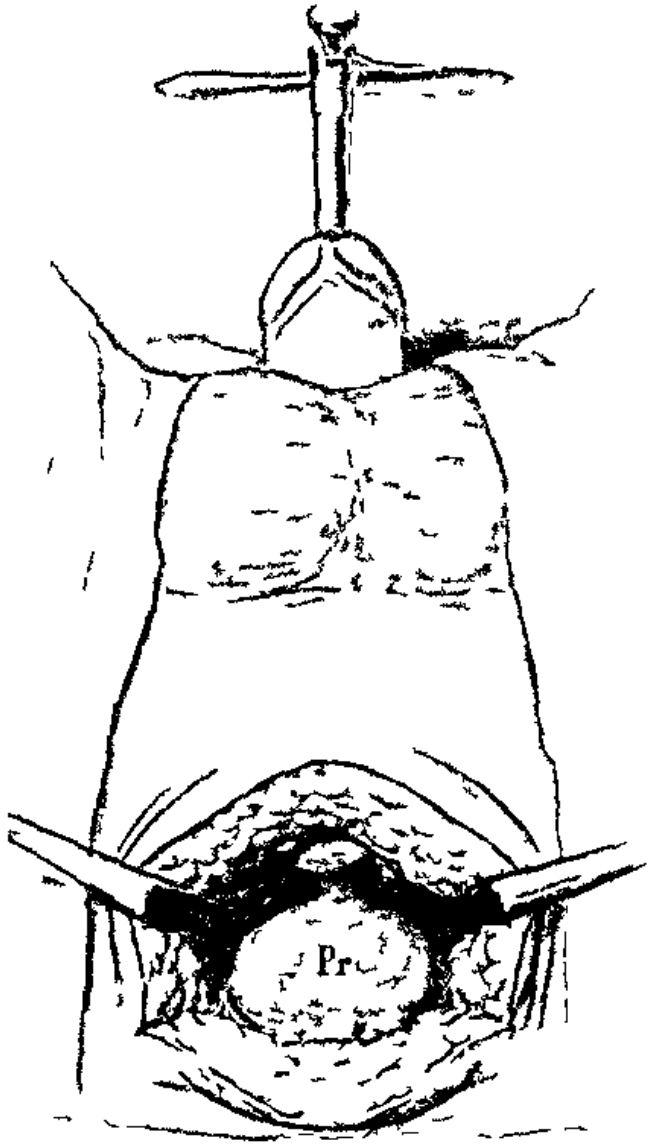


Fig. Perineal exposure of the prostate after the method of Young By pulling the prostate rectum through the rectal opening the membranous urethra and the deep cancerous tissue is minimized

the cystoscope is *in situ* the gland should be thoroughly examined *per rectum* as it is only by this method that careful and complete findings are possible

OPERATIVE TECHNIQUE

The technique as devised by one of us (B C Corbus) is as follows When there are symptoms of vesical obstruction with urea nitrogen retention due either to cancer of the prostate alone or to an associated benign hypertrophy a suprapubic cystotomy should be performed and the bladder put at rest until the patient is in the best possible condition for operation

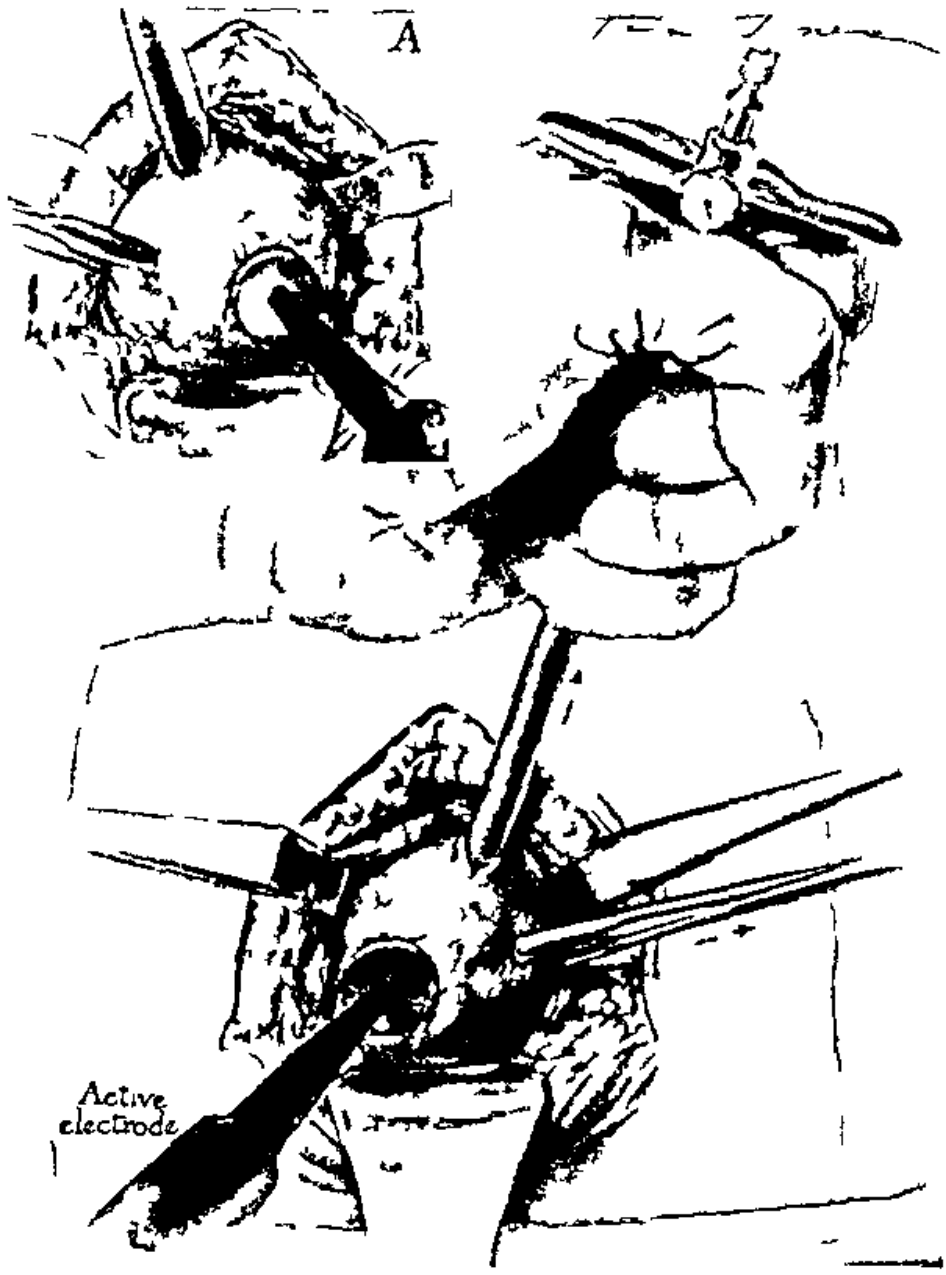


Fig. M th l f gul t g c f the post r l b. The fl t d k l trod d t ta t w th th f f D on ll By p ll g th tra tor t th ghta dl ft th h l ca be b ght ont t thth fl td k l t od

When simple hypertrophy accompanies the malignancy in the posterior lobe no attempt should be made at the time of coagulation of the cancerous growth to disturb the benign adenoma We must be sure that the cancer cells are all destroyed before we remove the obstruction lest we hasten metastases the one thing we wish to avoid in the destruction of all malignancies

PERINEAL PROSTATOMY WITH THERMOELECTRIC COAGULATION

Place the inactive electrode over the symphysis pubis with an intervening pad moistened well with hypertonic salt solution Equip the active electrode with a flat disk (0 5 centimeter in diameter)

After the prostatic bed has been exposed sufficiently to permit easy access to all of the cancerous growth the biopsy trocar or the tissue taker is next inserted into the growth and a piece taken for microscopical diagnosis Immediately following this procedure the location of the puncture is thoroughly coagulated This coagulation is then continued not only over all the area known to be involved in the malignancy but also to regions where there may be any possibility of involvement If the growth extends upward toward the

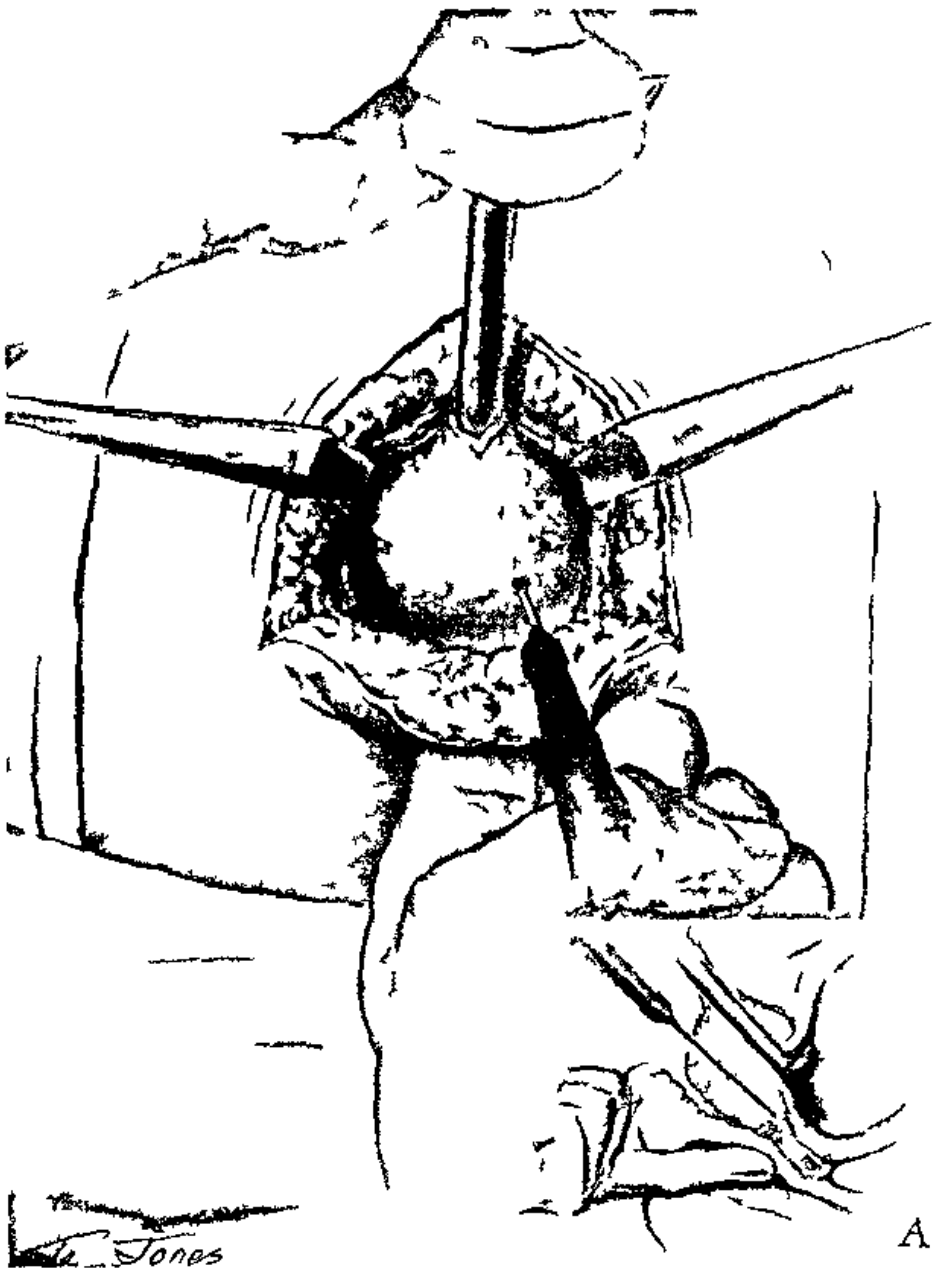


Fig 3 Method for ... gth d th rmy ne ll t th n us ... st ti l l
Th meth d d t c lw th th appl t n of d um a gg ted ly ... g

ve icl on either side the pro tate may be pulled a ide with a tenaculum and the di k electrode pushed to immediate contact with the growth When this is comp lete l the needle electrode i substituted for the disk as thi permits a still deeper carrying of heat into the di eased vesi le and with the distal finger in erted into the rectum as a guide its direction is m ore accurately con trolled so that any danger of perforating the rectal wall i avoided

Thermo electric coagulation of the cancer in the posterior lobe should be done slowly and care fully In order to keep the re tal wall from burn ing while u ing the flat disk electrode sponges moistened with hypertonic salt olution should be placed immediately outside of the area to be co agulated By placing the inactive electrode over the suprapubic region there is a direct path of heat tran fu ion which greatly facilitates the destruction of the growth

If there i no benign hypertrophy comp licating the cancerous growth an opening is made in the membranou urethra and a catheter is inserted into the bladder for drainage Otherwi e the drainage is continued from the suprapubic open ing The wound is next packed with strips of

gauze and the skin is closed as in perineal pros tatectomy Drainage may be removed in 24 to 48 hours

POSTOPERATIVE CARE

Postoperative care is the same as that after perineal prostatectomy

As previously stated when benign hypertrophy complicates the involvement in the posterior lobe several months should elapse before an attempt is made to remove the adenomatous tissue How ever this should only be attempted after thor ough roentgenological data shows no evidence of metastasis and likewise no evidence of local re currence

It mu t be remembered that the re ulting sclerosi following the diathermy i even more dense and uniform than that following X ray or radium and resulting contracture of the internal urethral orifice is inevitable if there has been extensive coagulation

When sclerosis has occurred we have employed linear cauterization (actual cautery) of the orifice through a suprapubic cystotomy Following this the remaining portions of the obstructing lobes are lowly coagulated by diathermy The fre quent passage of urethral sound a si ts in establishing rapid functional recovery

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THE REDUCTION AND CONTROL OF UNMANAGEABLE FRACTURES BY MEANS OF A METAL PRY PIN[1]

By J S WELCH M D F A C S Lincoln Nebraska

In the care of fractures the reduction and re tention of fragments is a problem of para mount importance The mechanical task of approximating in fair apposition the fragment ends and so holding them long enough for a re taining callus to form is often most difficult Such problems have drawn upon the ingenuity of surgeons of all time and as a result an endless number of splints traction and counter traction devices mechanical braces and open operations have originated In recent years especially since the world war certain concerted action to stand ardize the treatment of fractures has been under taken and not without definite progress Other things being equal the more simple the device or operative procedure the more satisfactory the results because its accomplishments are possible in the hands of the largest number of surgeons and practitioners But it must not only be simple it must also be safe It must be mechanically cor rect There must be the minimum chance of in jury to blood vessels and other soft ti sues The risk of infection must be reduced to a minimum Delayed risk due to buried wires plates screws nails etc often requiring extensive operative procedure for removal must be considered

It was with the idea of better meeting such indications in unmanageable fracture that the writer devised a so called pry pin method of reduction and retention some years ago Thi method was then recommended to the profession and the brief description published in the *Journal of the American Medical Association* March 20 1920 Recently my attention has been called to the fact that Dr Hugh Owen Thomas of Liver pool advocated some 50 years ago the u e of this principle to reduce obstinate cases of backward dislocation of the thumb The X ray was not then available and no mention was made of its as istance Moreover he did not refer to incor porating the pry pin in the cast for retention purposes a feature of great value in some cases The lever principle he did use in the reduction of compound fractures but simple fractures were rarely compounded by operation in tho e days The features herein recommended therefore are new so far as the writer is aware

During these years I have continued to u e this method in a limited number of fracture cases as have some of my colleagues in a more extensive experience and we believe that the results war rant a more general acquaintance and application of the method

THE FUNDAMENTAL PRINCIPLES

The fundamental principles underlying the method are few and relatively simple

1 A small blunt steel pin is used as a lever between fragments One bone end serves as the fulcrum to pry the other into apposition

R bef S M f Cl l Co gress f Am C S o Om h N br k F b y 9

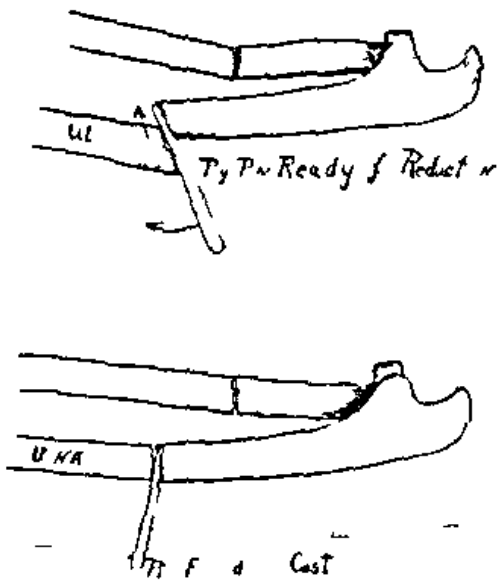


Fig Diagrammatic representation of pry pins employed in reduction and retention of fragments Note toothed edge of pin sometimes helpful in retaining contact with fragment To remove such a pin rotate 90 degrees and withdraw same as ordinary pin

2 The pry pin is guided or directed into position and correct apposition of fragments is judged by aid of the fluoroscope

3 Ordinary surgical asepsis is practiced and since the skin opening is reduced to a single puncture wound the risk is practically nil

4 Ten days to 2 weeks will suffice in most cases to develop callus sufficient to retain reduced fragments held in a satisfactory cast Then by simple extraction of the pry pin all further risk from buried mechanical retention devices ends In many cases the pry pin can be withdrawn at once if the fragment ends are so irregular as to retain their reduced position

5 The character of pin varies with the thickness of the extremity size of bone and strength of muscles It should be rigid but with bending properties rather than breaking when extreme force is applied Special irregularities of its surfaces where contact with ends of bony fragments is made may assist in retaining approximation (Ordinary thread cut on a tapering long shafted screw may be of assistance)

We have now tried this method with marked success in a moderate number of different cases in which repeated efforts to reduce or to reduce and retain had failed These failures were not alone in the hands of the enthusiastic devisor of the method but other colleagues of experience had also failed To date my experience and that of Dr J E M Thomson of Lincoln Nebraska (mentioned by correspondent) include fractures of the radius ulna tibia fibula femur humerus clavicle and metatarsal

Table I will give in abbreviated form the detail considered essential

It will be noted from this table that there have been no complications of note no infection no pressure necrosis and that the convalescence time is no more than that of like fractures requiring only simple standard methods for satisfactory management

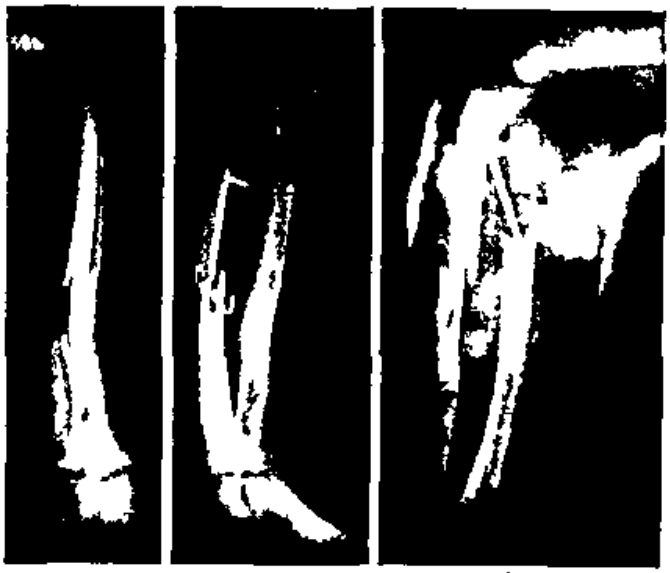
PRECAUTIONARY MEASURES

However like many surgical procedures with merit certain precautionary measures are noteworthy The time limit of safety to work under the fluoroscopic X ray is short and during the surgeon's enthusiastic wrestle with unwieldy fragments he must not forget this danger Of course a satisfactory X ray equipment is not always available but this disadvantage does not apply alone to the pry pin method Most fractures of



a b c

Fig 2 Original deformity b Attempted reduction under anesthesia Deformity fully still exists Reduction and retention with pry pin



b

Fig 3 R t t aft educti f led thr t m
First att mpt th p v p s c f l b P m ed
o f urt th d y

importance now a days are transported to an X ray or an X ray is brought in on the reduction problem

Further the pry pin method require working in the dark Thi i only relative since the greater X ray vi ion is here far more important Traction upon the leg or hand can be done as well without as with daylight

It i true aseptic surgical measures are difficult without ordinary light but since the introduction of the pry pin occurs but once and since its shaft can be well protected by sterile gauze no practical danger i encountered by working in the fluoroscopic dark room

Surgical anæsthesia i important for complete relaxation Thi differs in no particular from the ordinary reduction since complete relaxing anæsthesia i conceded essential in most fracture cases It should be continued until the plaster



Fig 4a Fract e weeks old Th ee ttempts at r
d t n fa led Ch ld 4 y rs old D Th mso s case



Fig 4b Pry p n r duct pe k f tself P
moved f tee th day

dre sing is on and the pry pin firmly incorporated in the same

In a paper recently read before the Lanca ter County Medical Society my colleague Dr J E M Thomson recommended an extension of this lever principle in case of large bones in very mu cular individual Traction by hand aided with the pry pin may not suffice to reduce the fracture in such individuals A fracture table and



Fig 5a Fra t f f m 4 eek ld M 35 rs
ld



Fig b D bl l r prin pl sed op perat
R m ed 4 d s

TABLE I CASE REPORT

C N and Ag	B	L l d t	I d t	L m d	C l	R lt	D
5 88	R d l th d	Impo bl	E	d	t 4 k	C ood	W
5 7 4	R d d l l th d Ul d pla d	Impo bl	E h d y	l y	wk	C ood	W
64 4	R d l l lbo	L w h d d f l d	4th d	4 l	6 k	Sl gh b y phy	W
37 5	R d d l m ddl th d	R d pe t d f l	I k	d	k	G od	W
45 5	H m fpe th d	F l d	th l y	Af t	U f l	Spl d d	T
66 4 37	T l d fit l l th d	F l d	4th d t b	Aft d	C f l	Sl h l mg A m O K	T
69 3	R d d l l w th d (lso h m)	F l d	L h b	8 d y	C f l	P f t	T
678	R l l l l th d	O h d f l d	th d y l th bo	N t d y	U tf l	P f t	T
56 3 3	T b d hb l l th d	O t 3	D T b bc t eo t t m	d y	U tf l	A t m O K L mp d k j y	T
7 3 8	T l d fib l	M p l t f y	R d	Aft	U tf l	P rf t	T
7 6 3	Th d m tat l	D ffi l	F d y	S m d t	T m d	A t m r f	T
7 66 7	R d l th d	F l d	S m d y	9 d y		P fect	T
69 4 4	F m m ddl th d	Oth d t f l l 3 t m	I k	5 d y	C tf l	P fect	T
4866 6	C l t l th d	D ffi lt	F rst d y	Af t w t	C l l	O K	T
6583 34	T b d fib l l th d	F l d	3 d day fib l	5 d y	C f l	P fect	T
6 5 35	F m middl th d (ll)	F l d	Aft 5 k d) lev	d y	C ev f l	A t m p fect j t t f lip plint	T

W—D Welch T—D Thom

mechanical traction is necessary With such a table it is difficult to use the fluoroscope Here it is that Dr Thomson suggests introducing the index finger through a small incision to guide the lever between fragments and to judge the position of same as reduction is accomplished In one such case he found a double lever very useful

In recommending this pry pin procedure after its successful application in a fair number of cases I wish to summarize its points of value as follows

1 The reduction of fragments occur under the more favorable fluoroscopic observation rather than the method of taking roentgenograms before and after reduction

2 The principles are simple

3 The danger to already damaged soft tissue about the fragments by too vigorous manipulation during attempted reduction in difficult cases is greatly lessened

4 The feature of retention of fragments is most helpful in selected cases

5 Considering the method an open operation it reduces the same to the minimum risk as such

6 The use of the pry pin in compound fractures is not necessarily contra indicated The pin gives the added advantage of drainage

7 No foreign body remains after 10 to 14 days and no secondary operation is required

8 No complications creditable to the pin *per se* have yet occurred

9 Its limitations appear in the largest bones with strong contracting muscles and where soft tissue intervenes between fragments and where large vessels are too near especially with pre existing hæmorrhage of note

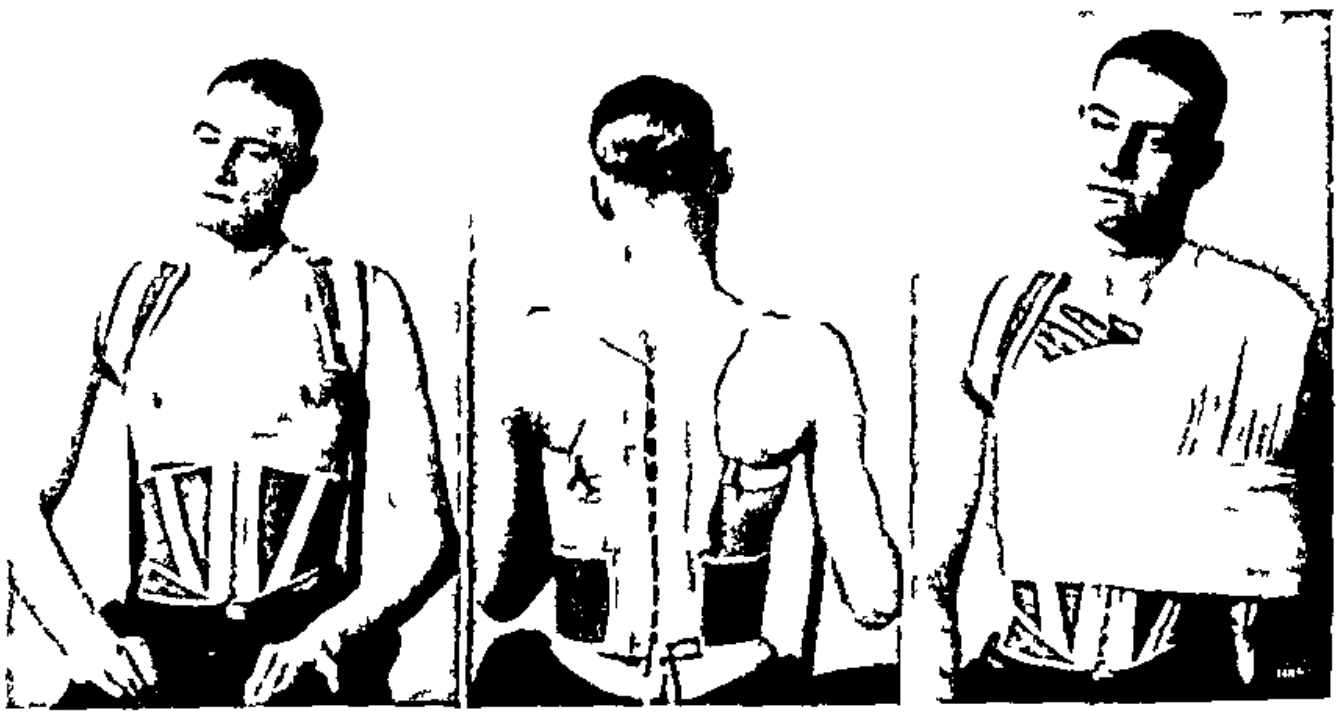
A COMFORTABLE APPARATUS IN THE TREATMENT OF FRACTURES OF THE CLAVICLE

By I W McGUIRE M D F A C S Buffalo New York

HIPPOCRATES treated fractures of the clavicle skillfully The great objection to his method was that it was uncomfortable If we look over our present method we find the same objection still exist If a dressing is uncomfortable it causes the patient to shift slightly and often until it becomes more or less loose thereby defeating its practicability

The apparatus I am presenting holds the shoulder backward in a comfortable manner The inner fragment is then brought into position by placing a flat bandage 2 5 inches wide over the inner fragment holding it in place by an adhesive plaster 2 5 inches wide and 15 to 18 inches long

The arm on the affected side is placed at the side of the body and is held in position by a Velpeau dressing



The principle involved in the treatment of fracture of the clavicle are the holding of the shoulder backward upward and outward The most important of these is the backward position As the shoulder is brought backward the outer fragment is brought into alignment

The abdominal support compels the patient to stand erect and stabilize the shoulder dressing I have found this apparatus to be the most comfortable I have used

THE INTRAVESICAL (CYSTOSCOPIC) TREATMENT OF CARCINOMA OF THE BLADDER BY IMPLANTATION OF RADIUM EMANATION TUBES

By A. HYMAN, M.D., F.A.C.S., New York.

In reviewing the literature dealing with the treatment of bladder malignancy it is apparent that a considerable change in the viewpoint of the urologist has slowly but surely taken place in the past decade. Until recently practically all reports on this subject were concerned with surgical procedures, i.e., excision of the growth or resection with or without ureteral implantation. During the past few years numerous articles have appeared describing the results obtained by a combination of surgery and radium and in some instances by radium alone. This change in attitude is due to the unfortunately poor results reported in those cases where surgery alone was used. As evidence of what may be expected from surgery alone the following statistical studies are presented. In 1915 Gardner (5) collected 666 cases of bladder tumors operated upon by different surgeons and found that in 224 cases requiring resection recurrences took place in 43.7 per cent within 3 years after operation, while in 44 cases of excision of the tumor recurrences occurred in 88 per cent. Lower (6) reports 81 cases in which resection was performed, there was a mortality of 51.2 per cent within the first year after operation. Scholl (7) from the Mayo Clinic analyzed 168 cases of epithelial tumors operated upon. In the first series of 71 cases described as malignant papilloma, 36.6 per cent of the patients died within a year following operation. Of 94 patients with solid carcinoma, over 71 per cent died within 7½ months after operation. The operative mortality following these procedures ranged between 10 and 15 per cent.

More satisfactory results have been obtained since a combination of radium with surgery has been employed, as indicated by reports of Barringer (1), Young (9), Buerger ( ), Bugbee (3), Cunningham (4), Smith (8), and others, so that at the present time it may be stated that this combination offers the best therapy at our disposal in the treatment of bladder carcinomata.

The treatment of certain forms of bladder malignancy by means of radium alone applied cystoscopically, although rather limited in its application, still has its field of usefulness. Its sphere up to the present time has been limited to a great extent on account of the difficulty in technique, the extra armamentarium required, and other factors that to a large extent have been overcome. The technique has been so simplified that the indications for this procedure will undoubtedly be broadened, and in certain selected cases will probably become the method of choice.

INDICATIONS FOR CYSTOSCOPIC RADIUM THERAPY

A few of the conditions in which the cystoscopic application of radium may be indicated are as follows:

1. As an adjuvant to fulguration. In the treatment of papillomata of the bladder the implantation of a few bare tubes into the base or the application of surface radium has proved of considerable value. Young states that owing to the potential malignancy of all bladder papillomata radium should be generally applied if possible. He is also of the opinion that the use of radium in benign papilloma of the bladder followed by fulguration gives results far superior to fulguration alone. Cunningham also advises the implantation of radium into benign tumors which are resistant to fulguration.

2. In aged and debilitated subjects in patients refusing operation or in cases where the surgeon deems operation inadvisable for various reasons.

3. In small pedunculated pathologically proved carcinomata presenting a benign appearance cystoscopically with no evidences of infiltration or œdema around the base. This type of tumor designated malignant papilloma although successfully treated by fulguration alone is likely to recur following the application of radium.

4. In small recurrences following operative removal of the primary carcinoma and in the recurrences following fulguration of papillomata it would be especially indicated. Inaccessible tumors although they may be otherwise suitable for the intravesical application of radium should not be treated as it is absolutely necessary to have a clear view of the entire field of operation.

METHODS OF INTRAVESICAL RADIUM APPLICATION

The surface application of radium to bladder growths has been found to be unsatisfactory in most instances. This method required special cystoscopes and applicators and necessitated the retention of the instrument in the bladder during treatment. Better results were obtained with the

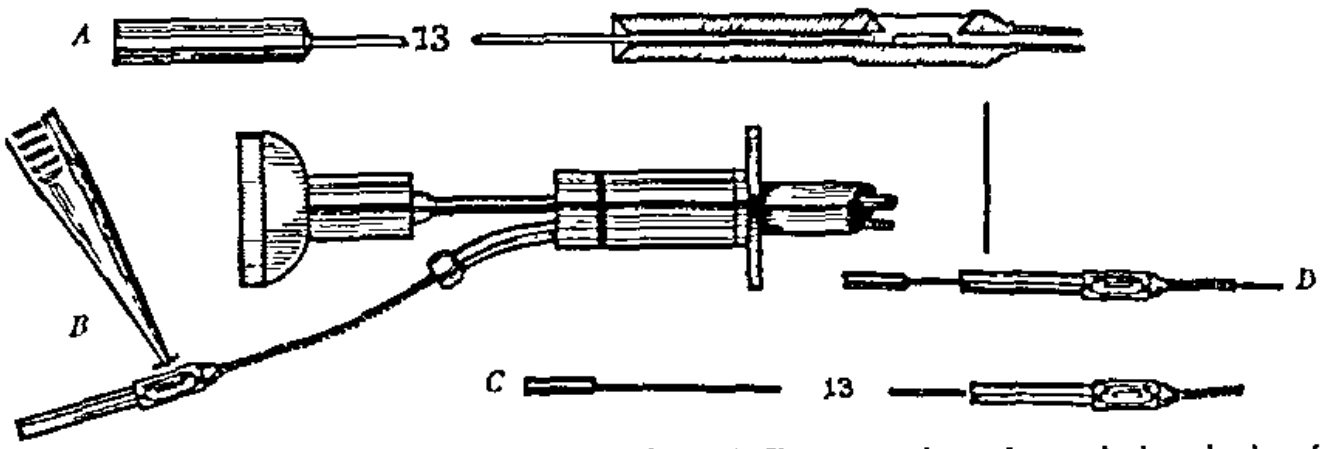


Fig. 1.—*A*, Longitudinal section of loading chamber of Murdoch seed applicator showing seed in place ready to be pushed ahead by plunger. *B*, Murdoch cystoscopic radium seed applicator inserted into cystoscope showing seed in front ready to be placed in loading chamber of applicator. *C*, Showing seed in place in loading chamber of seed applicator inserted in cystoscope. *D*, Wire plunger pushed seed to point in the needle open end. The operator now checks up the position of the needle before replacing plunger completely home. The seed is then placed into the predetermined position.

second method which consisted in the introduction of radium bearing needles directly into the growth. While the method is a great improvement over the surface radiation it still offers many technical difficulties and disadvantages which have not as yet been overcome. A considerable advance was made in intravesical radium therapy when seeds or bare tubes of radium emanation were first introduced into the growth. It may be stated that at the present time the consensus of opinion seems to be that the best results in intravesical radium therapy have been obtained by the implantation of seeds into the growth. The technique of Barringer and Smith has been simplified by improvements in the seed applicator to be described making the procedure one readily carried out by the trained cystoscopist. The instrument can be used through any ordinary operating or large catheterizing cystoscope with direct or indirect vision.

Bare tubes or seeds of radium emanation are tiny capillary tubes containing the emanation of radium. The dosage of each tube can be accurately measured, the average seed containing between 0.5 and 1 millicurie of radium emanation. The radio activity of a 1 millicurie seed gradually decreases in strength losing 16 per cent of its activity each day, so that at the end of about 6 days the tube is practically inert. Such a tube gives off 132 millicurie hours of emanation and is sufficient to destroy 1 cubic centimeter of tissue. The necrosis caused by the seed is very complete and the slough produced takes from 2 to 3 months to separate. According to Smith (8) it is inadvisable to implant seed in a growth having a diameter larger than 3 centimeters as the resulting toxæmia from the necrosis of so large an area is likely to cause death. Larger tumors than this should always be attacked suprapubically and proper drainage instituted. The seed remain in the growth until necrosis takes place when they are voided with the destroyed tumor tissue.

The seed applicator or introducer. The seed applicator or introducer, very simple in construction is illustrated in the accompanying diagrams. There are two types of introducers, one flexible for use with the ordinary cystoscope, the other

Edited by Dr. Joseph M.

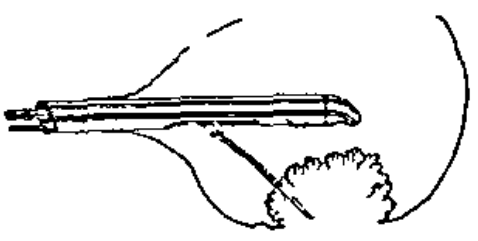


Fig. 2.—Diagrammatic view of the tip of cystoscope with Muir cystoscopic seed applicator deflected and displaced into tumor.

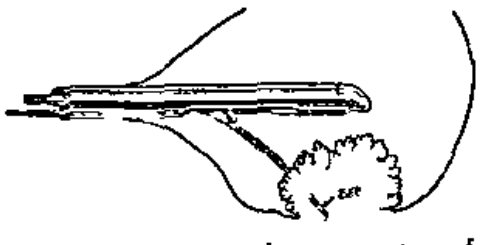


Fig. 3.—Tip of cystoscope showing position of seed when fully pushed home by plunger of cystoscopic seed applicator.



Fig. 4. A. Magnified diagrammatic view of needle applicator at tumor.

B. Same as A, but showing needle applicator in position.

C. The same as in view B, showing a superficial seed deposited.

D. Diagrammatic illustration of retention of tumor showing by numerals the distribution of both deep and superficial seeds.

rigid adapted for the direct vision cystoscope. The design of both is otherwise identical.

The applicator consists of a long flexible hollow wire tube with a small loading chamber at the proximal end in which the seed is placed. A wire mandrin is then introduced and serves to plunge the tubes into the growth.

The advantage of this new applicator lies in the fact that the seed is placed in the loading chamber at the proximal end of the instrument instead of the opening at the distal end as in the other types in use. This renders it easier and quicker to load and prevents the seed from dropping out during the course of the manipulation. Another advantage of the applicator is that it can be loaded without withdrawing it from the cystoscope. It is therefore possible to introduce two seeds into one tract in the tumor by simply withdrawing the introducer a short distance after the first seed has been implanted and then reloading the chamber with another bare tube. Much time saved is in the course of a treatment by this simple expedient of placing the seed chamber in the proximal end. We have on a few occasions planted over 20 seeds into a growth within three quarters of an hour.

Technique of application of seeds. The procedure can be rendered painless by a preliminary novocain sacral anæsthesia combined with an injection of novocain into the urethra and bladder. The cystoscope is introduced (the ordinary operating type of instrument is preferable) and the tumor brought into view. To facilitate matters a nurse or assistant loads the chamber of the applicator which is then plunged into the growth, the mandrin is inserted and the seed driven home. The method of implanatation varies with the size of the growth and the dosage of the seed. In general it may be stated that seeds containing 5 to 7 millicurie should not be implanted closer than

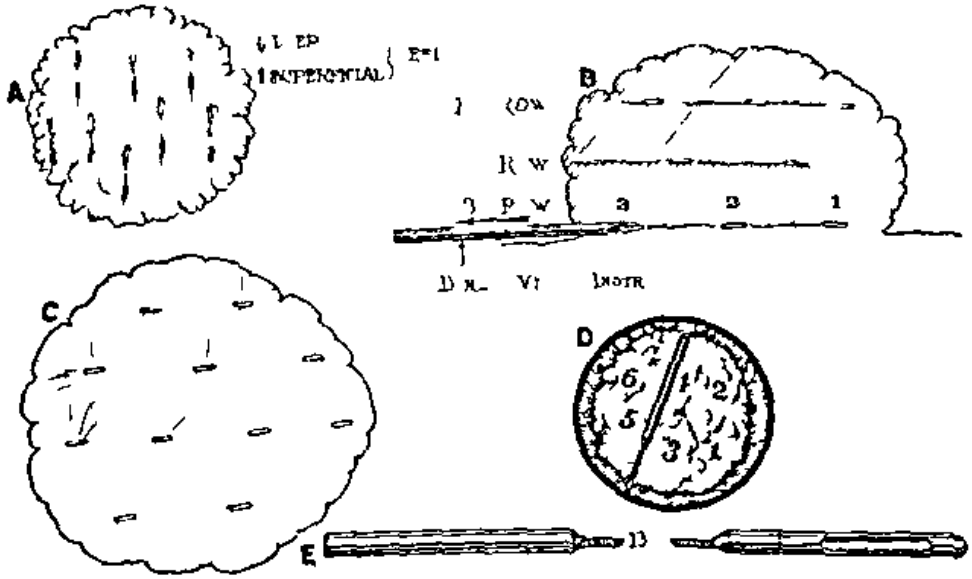


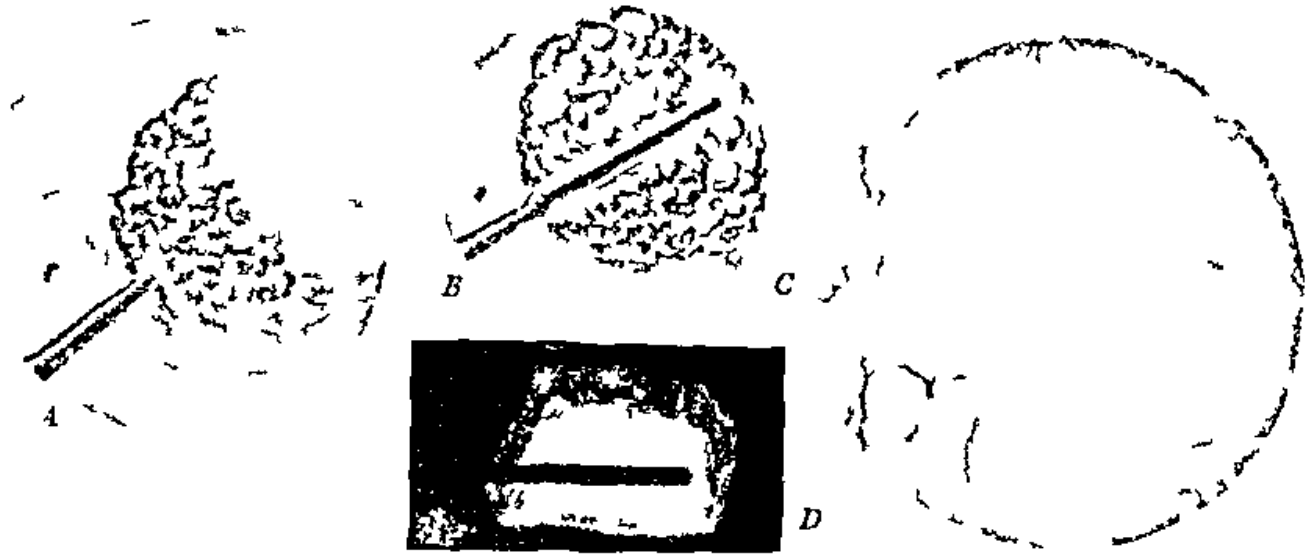
Fig. 5. *A.* Illustration showing the distribution in a typical case of both deep and superficial seeds from above.

B and *C.* Plan and elevation of a typical tumor. The method of distributing seeds by means of straight directive instrument (such as the McCarthy-Ockerblad).

and the Murphy cystoscopic seed applicator is clearly shown.

D. Diagram of cystoscopic view of high intensity application tumor showing by numerals the successive field of application.

E. Multiple high intensity radium emanation applicator.



F 6 1 Drawing show g a cyst scop c vie of a s s ll t m r f the blad le Th pper portio f the t mo lough g fr m f m r se d implantat n A flexibl ced co ey ng n edle s n ert d i t the l wer p rt of th tum

B Cy tosc p c v e f h gh intens ty rad m m nat tube ppl ed to bladd r t mo

C C mplete gression of the m ss in the me t m r

D Fl orescence bta ed by the appl cat f a h gh inte ty d um em nation t b t fr ment f w ll m t

5 centimeter With smaller radiating units more seeds may be employed Our first work was done with seed averaging 5 to 1 millicurie We are now using seeds with a smaller dosage 1 to 5 milli curie The resulting necrosis is less marked and a more even and thorough radiation is obtained

If the growth is a small one the treatment may be completed in one sitting larger tumors may require as many as three or four treatments The seeds are implanted around the periphery of the tumor and then into the tumor itself as schemati cally illustrated in the diagrams Care must be taken not to implant them into the normal bladder wall as the resulting necrosis may cause perfora tion The nearer a tumor is situated to the vesical sphincter the more care should be taken in the dosage employed for the inflammmatory reaction following radiation of a tumor so situated is likely to be more severe than in a growth located further back in the vesical cavity Following the im plantation of seeds it may be advisable in the larger growths to apply surface radiation This is readily accomplished with the surface applicator described The reaction following the implanta tion of seeds lasts from to 5 weeks and u ually manifests itself by increased bladder irritability burning frequency and dysuria A second treat ment should not be given until this reaction has subsided At any event there should be an interval of at least 2 to 3 weeks between treat ments even though the reaction is slight a longer interval 3 to 5 weeks is preferable Within a few weeks following a radium implantation the tumor presents a white slou hing appearance This slough may persist for 2 to 3 months before it is cast off

CONCLUSIONS

1 In certain selected cases of bladder malig nancy the cystoscopic application of radium has a field of usefulness

2 The results have been more satis factory than with any other form of intraves al radium application

3 The simplified technique required should render it the method of choice whenever endo vesical radium therapy is indicated

Following is a brief description of a case representing a type not infrequently encountered

Case 1 L S g 54 yea marrie ga e eg ti e f m ly h t y Tw l e years g be had att k f l ft l c l a d p ed a m ll tone Th prese t ill ess beg n ght m ths ag w th increased frequ ncy f rinat by d y a d n ght accompa d by burning Ther w n g o s hæmat ria at y t m but t rm l hæmaturia few occa n At t mes urinati n was i t rrupt f Th e n loss f ght and the g n ral health was g od Tw m th g h n ulted a urol gi t h mad d g os f carc om f th bladd f d is d perat which th p t t refused

Phys cal xami at He ll preserved and ad pose Abdomi l p lp t s n g t e The pro tate w s moderately e la ged d soft Th urine was cloudy ho ng p a d d blood cell

Cystosc py A gu t 5 19 3 On the r ht s d of th bl dd in the region f the r ght t l orifice th r a solid looking sph n l tum r bo t th iz of a med um sized pl m. There cedema ro d th gro th wh h seems to be sess l *Lig n th trig n is small irregu* l ly h ped lcul Th mod t tra es al

prostatic enlargement The rest of the bladder shows no abnormal changes Specimens removed with punch forceps were papillary carcinoma There were no evidences of infiltration of the base cystoscopically or per rectum

The patient refused operation and radium therapy was then decided upon August 22 1923 Under sacral nasthesia 25 seeds averaging 8 millicuries equalling 2066 millicurie hours were implanted into the lower half of the tumor which measured approximately 3½ by 4 centimeters in the knee There was a moderate reaction following in about 6 weeks following the treatment

October 10 1923 seven weeks after radium treatment second cystoscopy showed the entire lower half of the tumor treated was necrotic Twenty seeded wires implanted into the upper half of the tumor the loss gauge pulling 2 5 millicurie hours Surface radiation was applied equaling 5 millicurie hours to a given area There was moderate reaction following the treatment which lasted about 3 weeks

November 21 1923 cystoscopy demonstrated that almost half of the tumor had sloughed away and the remainder of the growth was entirely necrotic At this examination the stone was removed by lithotrity

January 8 1924 cystoscopy 4½ months after the first treatment showed that the entire slough had been cast off The base of the growth was covered with a mucopurulent exudate which was surrounded by an area of œdema There was no palpable tumor tissue to be seen The patient's subjective symptoms have almost entirely disappeared The urine still holds a trace containing small amounts of pus

Addenda October 5 1924 Cystoscopy little over a year after the last radium treatment showed an normal bladder It is impossible to identify the former site of the growth There were no subjective urinary symptoms

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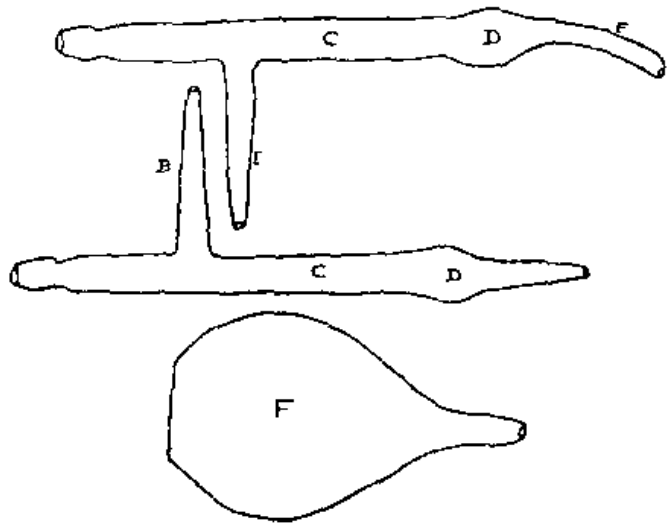
A SIMPLIFIED APPARATUS FOR TESTING THE PATENCY OF THE FALLOPIAN TUBES WITH ACCURACY

BY ROBERT T FERGUSON MD FACS CHATTANOOGA TENN

After using for some time the apparatus designed by Dr I C Rubin of New York for testing the patency of the fallopian tube and after trying later the ordinary ear syringe with glass tube attached without any attempt to register the amount of pressure in any given case as practiced in so many hospitals and clinics today I have devised the apparatus illustrated The apparatus is equipped with a right angled glass tube attachment for a rubber tube leading to a mercurial manometer so that the pressure can be gauged at all times This eliminates the danger of using too great a pressure and the possibility of rupturing the tubes with disastrous results

The advantages claimed for this apparatus are simplicity safety negligible cost the ability to sterilize as a whole and the fact that a very small quantity of air can be injected into the peritoneal cavity as the pressure is under absolute control of the fingers and can be released instantly Also patients complain of practically no discomfort following the test and are able to continue their vocation immediately

The tube can be curved so as to meet any abnormal position of the uterus such as anteflexion or retroflexion or retroversion or if preferred it can be attached to the ordinary Keyes Ultzman syringe by a short rubber tube connection



a Tip for attachment of rubber bulb *b* tip for attachment of rubber tube leading to manometer *c* glass tube *d* bulb which plugs cervix and prevents escape of air from uterus *e* rubber tube for attachment to ordinary ear syringe

I claim no originality except for the offset on the glass tube by which it is possible to attach a rubber tube to manometer and the bulb near the tip to prevent escape of air from uterus This may have been used before but I have never seen it used or described I have found it an almost indispensable piece of apparatus

EDITORIALS

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DECEMBER 1924

STRICTURE OF THE COMMON BILE DUCT

STRICTURE of the common bile duct while fortunately infrequent has serious results because of interference with the normal flow of bile.

The structure of the common duct is similar to that of many other tubes of conveyance. It is lined with a columnar epithelium outside of which is an elastic layer and a very thin muscle layer composed of only a few scattered bundles on top of this layer is a coat of fibrous tissue. It is doubtful whether there is sufficient muscle tissue in the duct to produce contraction and it is not known whether or not the bile is urged on by peristaltic contractions. The duct can be greatly dilated and yet apparently maintain its function. Often one or more stones are found wedged under considerable pressure into it apparently completely destroying the mucous lining in that area and yet strictures seldom occur under such conditions. In a review of a large number of cases in the Mayo Clinic in which operation had been performed for disease of the common duct in only four did it appear that a stricture had developed in the duct as the result of trauma from the pressure of impacted stones. Furthermore these strictures were not complete, they allowed a certain amount of bile to pass and therefore were less serious than is sometimes the case. In view of the fact that pressure from an impacted stone must often produce necrosis of some of the tissue layers composing the duct it is fortunate that the mucous membrane does regenerate rapidly.

Stricture of the common duct following removal of the gall bladder must be the result of technical error and yet there are cases in which it is difficult to explain its occurrence. It is impossible to overemphasize the importance of isolating the lower end of the gall bladder and cystic duct before applying clamps in the performance of a cholecystectomy. If this is done a stricture will never occur. The idea that the entire cystic duct should be removed in performing a cholecystectomy is apparently wrong, for so far as the results are concerned it is unnecessary and moreover attempts to remove the duct completely may cause enough disturbance in the surrounding tissues to result in stricture of the common duct. The number of instances in which the stump of a cystic duct has caused trouble does not warrant consideration. Common duct stricture may be divided into three groups according to the manner in which the symptoms present themselves.

Group 1 includes those cases in which jaundice develops shortly after cholecystectomy but in which there is never any drainage of bile and the early convalescence seems normal. The jaundice increases rapidly from the onset and within a few weeks the patient

presents a typical picture of complete jaundice Usually there is no pain although there may be attacks of rather sharp colic following which the jaundice deepens considerably On re operating in these cases the common duct has usually been found to be completely severed or entirely closed by firm stricture At times the only evidence of the duct is a little bud on the under surface of the liver at the site of the common duct It is difficult to determine just what occurred at the time of the first operation but probably the operator was unaware of trauma to the duct and yet in some instances the absence of an inch or more of the extrahepatic ducts has been discovered In some cases the duct may have been severed and tied or else entirely included within the tie on the cystic duct or vessels

Group 2 differs from Group 1 in that a few hours after the gall bladder has been removed bile drains freely from the wound and this continues throughout the convalescence In many instances it can be demonstrated that all of the bile is draining through the post operative wound and none is passing into the intestinal tract Such drainage usually continue for a few weeks then decreases gradually and jaundice develops The wound may open a few times and drain bile before it closes permanently In these cases also the common duct will be found to be completely closed by stricture and often the distal part of the duct cannot be located

Group 3 consists of interesting cases in which it is difficult to explain the cause of the trouble The characteristic feature is that the patient has a normal or nearly normal convalescence following cholecystectomy and for six months or more is entirely well in most instances being able to return to his work Then without any warning jaundice appears It may be intermittent at first but later constant and usually never entirely disappears Sometimes these patients have attacks of severe pain chills and fever and a diagnosis of common duct stone is often made It should be stated that in many cases of common duct stricture small stones are found above the stricture area but undoubtedly they are secondary to the obstruction of the common duct In this group the jaundice gradually deepens and in a few weeks becomes complete If the old operative field is exposed the common duct will be found to be completely closed in most of these cases a part of the duct is missing and it lacks continuity In view of the fact that the duct must have been patent for at least six months after the removal of the gall bladder it is difficult to explain what happened at the time of the cholecystectomy that would account for this condition six months later Eleven patients in this condition have been observed at the Clinic all in a state of complete jaundice at the time they presented themselves It would seem that adhesions gradually contracting making pressure and finally resulting in necrosis might explain some of the cases Likewise it has appeared that as the result of using a large amount of gauze drainage especially around the duct a marked reaction in the tissues might finally have caused the stricture And it is possible that in an attempt to remove the entire cystic duct the circulation in the common duct was interfered with so that the tissue in the duct was gradually replaced by scar tissue

Although one is at a loss to know how to explain just how and why these strictures develop nevertheless it may be said that if at the time of the operation for the removal of the gall bladder the lower end of the gall bladder and the adjoining portion of the cystic duct are completely isolated before clamps or ligatures are applied strictures will not occur

F Starr Judd

POISONING BY PROTEIN SPLIT PRODUCTS ITS IMPORTANCE IN SURGICAL PRACTICE

THAT intoxication with protein cleavage products may lead to certain pathological manifestations has long been recognized Until recently however the clinical importance of this had been clearly established only in regard to those conditions which were of interest to the physician rather than to the surgeon Of late more and more evidence has been accumulated to indicate that disorders which properly come within the domain of surgery owe their origin to this form of intoxication

Acute anaphylactic shock represents an unquestioned example of poisoning by protein split products In this condition as well known there occur histological changes in certain organs especially the kidney and the intestines Along with these structural changes the composition of the blood is altered an increase in the non protein nitrogen and a fall in the chlorides taking place It appears that there is an initial increase and a late decrease in the hydrogen ion concentration of the blood or expressed differently the alkali reserve first falls and then rises

In intestinal obstruction symptoms occur which resemble those seen in anaphylaxis It has long been felt that the poison responsible for these manifestations is a protein derivative and this appears to have been confirmed by the demonstration of histamine in the lumen of the obstructed bowel Furthermore changes in the kidney and in the intestine similar to those occurring in anaphylactic shock have been observed after death from intestinal obstruction and in both conditions there is seen the rise of blood nitrogen and the fall in the chlorides

It seems extremely probable that secondary traumatic shock is often the result of poisoning by protein cleavage products The blood concentration the rise in the non protein nitrogen which occur in traumatic shock resemble the changes seen in anaphylaxis and the striking similarity in the circulatory reactions in shock and after the injection of histamine support the view that protein split products arising in the traumatized muscles are responsible for the changes which take place in the former condition

In peritonitis likewise there is little question but that we have an instance of protein cleavage product intoxication When the peritonitis arises from intestinal perforation conditions ideal for the decomposition of the protein seem to exist since there is present an albuminous fluid teeming with proteolytic bacteria That toxic substances derived from protein are actually produced and give rise to the symptoms is rendered likely by the histological changes which are produced in such organs as the intestine and the kidneys these changes resembling those seen in anaphylactic shock and after death from intestinal obstruction In peritonitis also changes occur in the blood identical with those that have been described in traumatic shock and in certain respects similar to those seen in intestinal obstruction and in acute anaphylactic shock

Of especial interest however are the recent observations on the pathological disturbances following extensive superficial burn That an organic poison was produced in the burned tissue and was responsible for the toxemia and death which often occurred after such burns is not a new idea and it was known further that characteristic histological changes occurred in persons or animals dead of such burns these histological alterations occurring in the suprarenals the kidneys and the intestines and being apparently identical with those described as existing in other instances of protein derivative intoxication The recent

experiments mentioned have furnished proof of the existence of the poison in the burned tissues and of its transport by the red blood corpuscles

What is the obvious lesson of these observations? Experimentation is of little value unless it leads directly or ultimately to improvement in our therapeutic methods Laboratory workers have shown that the removal of crushed muscular tissue will prevent the development of shock symptoms in experimental animals army surgeons have successfully applied this method of treatment clinically the explanation for the good results in both instances being that the source of the poisonous cleavage products is removed by the process of debridement Similarly it has been shown both by experiments on lower animals and by clinical trial that a like good effect follows the application of this principle in the treatment of diffuse peritonitis By saline irrigation and suction the decomposing peritoneal exudate may be removed effectively and the striking immediate improvement in the patient can be likened to nothing more appropriately than to the result of the use of antitoxin in the treatment of diphtheritic infection

It has been found that by removing burned tissue from one animal and engrafting it into another the toxemia will be prevented in the first and developed in the second animal Such a result as this would seem to offer a logical argument for the employment of debridement in the treatment of burns To suggest the removal of all the tissue killed by the burn may appear to be ultra radical but when it is borne in mind that this tissue will eventually be sloughed off during the course of which poisons will be produced locally that will seriously injure the patient justification is seen for such a procedure By boldly removing this dead tissue the patient is spared the intoxication which would otherwise occur and moreover the process of local healing is much hastened If sloughing is allowed to take place healing is accomplished by slow granulation if the dead tissue is removed cleanly healing by first intention will be the result Of scarcely less importance is the relief from pain the comparative comfort of the patient being a great contrast to the suffering which is an invariable accompaniment of the older conservative methods of treatment of burns

The surgeon who applies the method of débridement in the treatment of severe superficial burns cannot fail to be impressed by the lessening or prevention of toxæmia the hastening of local healing and the relief from suffering afforded the patient

A Murat Willis

MASTER SURGEONS OF AMERICA

JAMES EDWARD MOORE

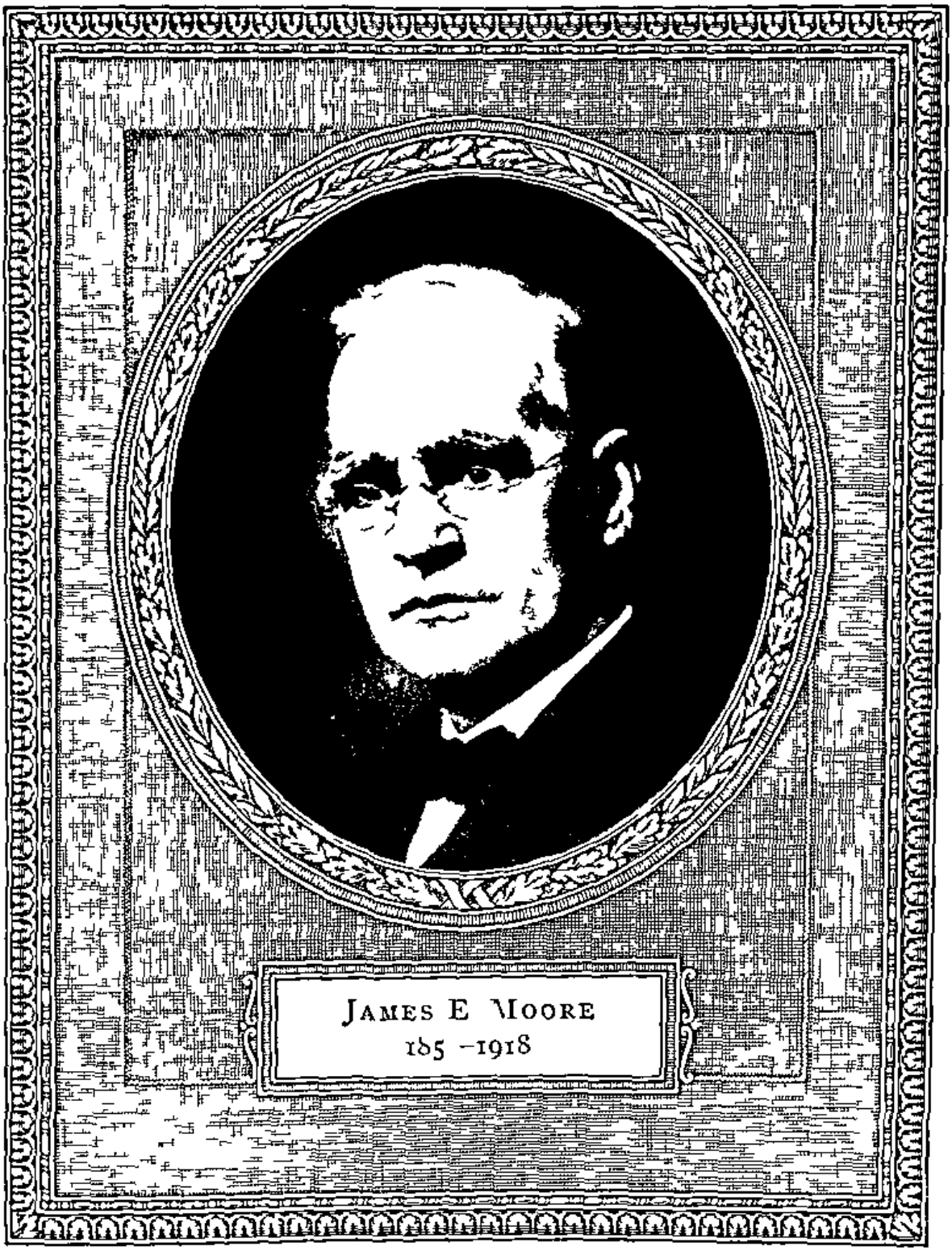
JAMES EDWARD MOORE was born in Clarksville Pennsylvania on March 2 1852 and died in Minneapolis Minnesota November 2 1918 of pernicious anæmia He was the son of the Reverend George W and Margaret (Ziegler) Moore

He received his preliminary education in the public schools of Pennsylvania later attended the Poland Union Seminary at Poland Ohio subsequently the University of Michigan receiving his medical degree from the Bellevue Hospital Medical College of New York in 1873 The year following his graduation he practiced in Fort Wayne Indiana He then returned to New York for post graduate work in the hospitals In 1876 he established himself in Emlenton Pennsylvania where for six years he performed the arduous work of a country practitioner making most of his calls on horseback and dispensing from his saddle bags

In 1882 he moved to Minneapolis Minnesota and practiced there as a general practitioner until 1885 when he went to Europe and studied in London Paris and Berlin *Returning to Minneapolis in 1887 he announced himself as specializing* exclusively in surgery He was the first specialist in surgery west of New York to so announce himself

Always profoundly interested in medical education upon the organization of the medical school of the University of Minnesota Dr Moore was appointed one of the faculty of that institution He held in succession the positions of professor of orthopedic surgery professor of clinical surgery and professor of surgery In 1904 he was made chief of the department of surgery and held this position until his death on November 2 1918

Dr Moore was blessed with the rare gift of imparting knowledge he was a born teacher He presented his subjects in a simple terse logical manner With a splendid command of English with an earnest enthusiasm, with a native dignity and a quiet eloquence his logical summaries carried conviction He was forceful and emphatic yet temperate and restrained in all of his utterances and his actions He contributed generously of his money of his time and of his energy to the upbuilding of the medical school The welfare of this school was very close to his heart Successive generations of students sat at the feet of this master



JAMES E MOORE
185 –1918

teacher of surgery of whom it has been said that he was one of the four great teachers of surgery in the United States He was a virile lucid convincing writer He was the author of a number of chapters contributed to the various American systems of surgery In 1885 he published his work on *Orthopedic Surgery* The literature of surgery has been greatly enriched by his contributions to that science he having written and published over 200 papers on surgical subjects His writings and discussions won him recognition at home and abroad and he early became identified with the representative surgical societies being a fellow of the American Surgical Association and its vice president in 1905 a fellow of the Western Surgical Association and its president in 1902 a fellow of the Southern Surgical Association chairman of the surgical section of the American Medical Association in 1903 a member of the judicial council of the American Medical Association a fellow of the American College of Surgeons and a member of the Board of Governors a member of the Societ Internationale de Chirurgie a member of the Minnesota Academy of Medicine and of all the local state and county societies

Perhaps more than any one man who has passed into the great beyond James Edward Moore left his imprint upon the profession of the middle west His renown as a teacher of surgical subjects spread beyond the confine of his own territory and the influence of that teaching was disseminated over the land through the hundreds of students who are privileged to reflect his influence His devotion to the University Medical School was proverbial a devotion which unquestionably shortened his life

In February 1910 while lecturing to the junior class of students in an old building which had been partially destroyed by fire the ruins of a brick chimney fell and buried him in the debris injuring him so severely that for days his life was despaired of His former robust health was never regained His health failing he retired from the practice of surgery in 1915 and for the rest of his life devoted himself entirely to surgical teaching and surgical clinics at the University of Minnesota

Dr Moore was as much a victim of the Great War as though he himself had gone over the top and paid the supreme sacrifice in Flanders or on the fields of France His high sense of duty unquestionably shortened his life In 1917 and 1918 the Great War drained the medical school of the University of Minnesota as it did all other medical schools of its teachers This threw an added burden upon those who were left a burden which was doubly difficult to bear when laid upon the shoulders of a man already frail and well along in years Uncomplainingly he shouldered the added burden feeling that he was doing his bit in helping to do the work of his absent boys who were over seas The strain anxiety and overwork but hastened a breakdown made inevitable by his insidious disease

To the many who were permitted to know Dr Moore well and to the few who were privileged to be his intimates the charm of his personality his simple manly creed his love of justice and fair play his intolerance of incompetence and sham his charity for human weakness and frailty his keen appraisement of character his fearless championship of right and above all his great human sympathy for those in trouble or distress —one and all were traits which appealed and bred love respect and deference

For 36 years this Nestor of the profession of the northwest left a serious imprint on the medical life of his community The influence of his example skill and teaching on the medical life of the middle west through these formative years helped to blaze the trail and to mold stimulate and standardize the surgical trend of medicine toward the very highest type

As a teacher surgeon and friend he was a constant inspiration his life a model which helped to shape the destinies of his students and inspire the emulation of his fellows He illustrates the old poem—

The heights by great men reached and kept
Were not attained by sudden flight
But they while their companions slept
Were toiling upward in the night

ARTHUR A LAW

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD JUNE 20 1924 DR CHARLES S BACON PRESIDING

CYSTADENOMA OF THE OVARY CONGENITAL DIAPHRAGMATIC HERNIA

DR GALLOWAY reported a case of cystadenoma of the ovary in a woman 24 years of age who was married and had had no labor The main thing about her history was metrorrhagia and menorrhagia with periods of bleeding as long as 20 to 25 days She had also noticed an enlargement or tumor mass in the lower abdomen The tumor mass extended 2 to 3 centimeters above the umbilicus She was operated on about 10 days later and the right ovary was a symmetrical mass about 7 inches in diameter quite hard and not adherent It had a pedicle that was twisted one and one half times The uterus was small and normal and the left ovary and tube were normal The mass was removed without any shock to the patient and she made a complete recovery

There were areas of cystic degeneration throughout the tumor mass and it was mostly composed of hard fibrous connective tissue There were areas of necrotic epithelium lining some of these spaces

DR GALLOWAY reported another case that of primipara age 24 who went into labor about 9 o clock in the morning and was delivered about 11 o clock the same night by simple low forceps

The baby did not breathe at least we could not get it to breathe though the heart beat The queer thing about the case was that the heart beat was on the right side and could be felt in the anterior axillary line The baby was of fair color when it was born The tracheal catheter did not do any good There was difficulty in getting any respiration even with the tracheal catheter in

We did not have a complete autopsy on the case The condition turned out to be a congenital diaphragmatic hernia on the left side with almost all of the abdominal viscera in the left side of the chest The left lung was compressed down to nothing but a piece of tissue the size of a fifty cent piece The heart was pushed to the right side

On looking up the literature I found that one man had reported 635 of these cases of which 520 were left sided Keith analyzed 35 of these hernias very well and said that the liver protects the right side to some extent and that the embryological development of the diaphragm permits the descent of the diaphragm which takes the phrenic nerve with it so that apertures are formed through which the lungs are allowed to go to their position in the thorax The apertures close later on Those on the right side close before those on the left and the position of the liver helps them to close If that aperture remains open the possibility of hernia is quite likely

DISCUSSION

DR IRVING F STEIN In 1914 I published a case in SURGERY GYNECOLOGY AND OBSTETRICS almost identical to the picture Dr Galloway has shown in which we found the heart on the right side The baby lived 26 days During that time we made X ray studies which showed the stomach well into the chest and the diaphragm which reached the second rib was thinned out to a fibrous partition All of the abdominal organs were in the chest The baby failed to thrive and died in cyanosis

DR W C DANFORTH contributed a paper entitled A Criticism of Certain Tendencies in Obstetrics

FIVE YEAR END RESULTS OBTAINED IN CARCINOMA OF THE PELVIC ORGANS WITH RADIUM AND X RAYS

DR HENRY SCHMITZ read a paper on Five Year End Results Obtained in Carcinoma of the Pelvic Organs with Radium and X rays (See page 775)

DISCUSSION

DR EMIL PIES Every time I listen to a discussion on the treatment of carcinoma of the cervix by radium I am more bewildered than before Here we have reports of cases which to all intents and purposes were hopeless staying cured for five years There is a wide discrepancy between these statistics and the rationale of the method We are told right and left that the X ray does not cure carcinoma The theory now is that the X ray produces certain substances which kill the carcinoma Then why did death result in the cases in Class I or Class II when in Class IV the substances produced by the X ray or radium gave a cure?

The technique of radiation treatment of cancer is not clearly presented by physicists whose idea of carcinoma is that it is like a button they want to reach that button and if you reach it with enough ray that is all that is necessary They do not know anything about lymphatics or about the spread of

carcinoma It is not the action of the rays on that button but the action on the system which produces curing factors As it stands now the theory is absolutely bewildering Nevertheless there is the outstanding fact that cases that we cannot handle with any kind of operation have done well under the treatment described

As far as operation is concerned it should be really radical The Wertheim operation is entirely wrong because tissues are left standing between the primary cancer and the lymph glands Also a radical operation in which no attempt is made to remove the lymph glands as extensively as possible is not a radical operation The Wertheim operation has become popular because it is much less dangerous as to primary mortality than my operation No one knows what a really radical operation will do because it has not been carried out in enough cases I am not speaking of my own cases because I have not had 100 cases and the chances of bringing you 100 cases in the near future are becoming less because since the advent of radium and the X ray practically all patients to whom you tell the truth about the operative mortality very naturally take their chances with radium or the X ray rather than the risk of dying within a few days from the operation I hope radium and the X ray will be so perfected that we can abandon operating altogether but I am not ready to do it Whenever a patient comes to me I tell her truly the results of the radical operation the primary mortality the number of recoveries and the results from the use of radium and the X ray I have therefore very few cases who come to operation I have not operated upon a single case of carcinoma of the cervix this year I have 5 patients who for 5 months have been under radiation therapy They were all inoperable when they came to me but I can report cases that I operated on many years ago Last Christmas I had a card from a woman I operated upon in 1901 23 years ago She had an enormous carcinoma of the cervix and the lymph glands along the iliac were so big that the biggest one was the size of the end of my thumb and she is alive today I have one patient living upon whom I operated in 1897 She lives in Texas and I have a report from her physician that she is alive This one had no carcinoma in the lymph glands Wertheim once made the statement that no patient in whom he found a carcinoma of the lymph glands ever lived All the patients with inoperable carcinomata whom I have returned over to the X ray men are dead

As far as my recurrent cases are concerned I have not one patient who has lived over a year I do not treat them I turn them over to the radium and X ray men

Dr A H Curtis Our results from operation on carcinoma of the cervix have been extremely disappointing Dr Watkins has not entirely given up operating on the cervix cancer but I have done so for the present at least I do not know what my attitude will be five years from now I would estimate that we are able to obtain permanent cure in twice as many patients through radium and X ray therapy Dr Jones works both with Dr Watkins and with me so he has an opportunity to compare results he is strongly of the opinion that even in operable cases radium and X ray are preferable to operation

Dr Mark T Goldstine I believe that there are certain carcinomata of the cervix early ones that will get well no matter what treatment you use Byrne of Brooklyn cured some early carcinomata of the cervix by cauterization There are polyps in the cervix that are early carcinoma and if the polyp is removed a cure may result I have had a number of cases in which a polyp was removed early from the cervix and diagnosed carcinoma. Later on when the uterus was removed and sections made of it we could not find any evidence of carcinoma in hundreds of sections If all the carcinoma tissue can be removed with the knife or radium or if an ordinary hysterectomy is done there is a chance of cure

That brings up the point of how many carcinomata of the cervix are cured with radium or X ray or any treatment When I have used the radical method I have had a high mortality I have patients living 9 to 12 years upon whom I used the operation I have described Two years ago a woman came with a mass in the cervix just inside the external os We removed a part of the mass and diagnosed it adenocarcinoma. She left without treatment I saw her two weeks ago She said I am perfectly well I have not lost any weight I am all right She had nothing but a curettage by another surgeon

As long as I can find one lymph gland I will not trust to radium or X ray Carcinoma does not occur in the lymph glands often Just as long as I find once in a while a gland that is carcinomatous I am going to stick to surgery and advise what I think is a radical operation Our operation is still not radical enough because we find some very difficult cases in which the carcinoma of the cervix is near the anterior wall of the rectum and hard to dissect out

Dr Henry Schmitz (closing) I probably may have anticipated some of this discussion and therefore stated the results for the clinics of Dr Clark and Dr Kehler who have treated a large number of cases by X ray and have had the same results as I have X ray and radium do not act in the same way The treatment is specific We do not know that it cures Before we knew anything about the causation of carcinoma we were able to cure the cervix fairly well As soon as we learn a specific cause of carcinoma then we will be able to correctly interpret all these clinical observations which we make now We have attempted to go into the study of the action of radium and there are two investigations which we have made which are really of great interest It has been proved that a patient with cancer develops a serum and that is the specific power of the

serum which digests the cancer cell In 1912 some cases were reported in which the cancer was removed surgically one of the rectum and one of the breast They were also shown not to possess any lytic power but after operation they acquired this About a year or two ago we took about 5 consecutive cases and after working with serum made from the patients we obtained some carcinoma serum from Vienna In 15 of the cases after radium and X ray application there was a reestablishment of carcinoma power within eight days after the treatment We could not explain why this happened We went ahead and had about 35 cases of cancer of different types cervix chiefly and we made a determination of the non protein nitrogen urea and creatinin constituents of the blood We found that in the cases that we had treated with the X ray there was a marked increase in the nitrogen tolerance If this increase persisted that patient would very probably succumb to the disease On the other hand if the blood went back to normal in two or three weeks the patient was clinically improved There were some patients who did not get any reaction at all and still in these the conditions were most advanced Therefore we concluded that in patients with advanced carcinoma suffering from auto intoxication it is not worth while to use radium or the X ray because they have not the power to activate the necessary toxins to overcome the cancer cell We must remember that any method that enables us to remove or destroy any particular cancer cell will cure the patient It does not make any difference what we use As long as it is possible for us to eradicate all the cancer cell I am perfectly willing to admit that we cure the disease

CORRESPONDENCE

REMOVAL OF NEEDLE FROM TISSUE WITH THE AID OF THE FLUOROSCOPE

To the Editor I have found the removal of needles a difficult matter because it is impossible to locate them even though X ray film have been made I have found that the following method converts the situation into an easy one

Over the site of the needle which is usually evident (if not the X ray will give the general location) an incision is made under local anæsthesia through the tissues to a reasonable depth The site of the incision is marked by picking up a little of its tissue with a mosquito tissue forceps With the wound under the fluoroscope a second hæmostat is inserted into the wound and under visualization of the fluoroscope is guided to the needle which is grasped the hæmostat made fast and the needle removed This easily accomplished in a light room

F R Makelson M D

Oakland California

THE USE OF LEVERAGE IN THE REDUCTION OF FRACTURES

To the Editor Since the appearance of my articles on The use of Leverage in the Reduction of Fractures which appeared in the September number of Surgery Gynecology and Obstetrics I have had a number of inquiries in regard to the type of dental probe that I use in carrying out this technique

The dental probe is the dental hatchet the spoons the file or almost any long handled straight dental instrument It is our custom to file off the end of the instrument before using it for leverage purposes

J F M Thomson M D

Lincoln Nebraska

REQUEST FOR BACK NUMBERS

To the Editor I would like to call attention through your columns to the fact that there are many foreign physicians and surgeons who cannot afford to purchase Surgery Gynecology and Obstetrics who would appreciate very much receiving the journal

If any subscribers who do not keep copies for binding would send them for this purpose to my address I shall be pleased to receive and forward them

Rosalie S Morton M D

Post Graduate Hospital New York City

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J. BROWN, M.D., F.A.C.S., Omaha

THE PENTATEUCH AND OPERATIONS OF SURGERY BY HIERONYMUS FABRICIUS OF ACQUAPENDENTI

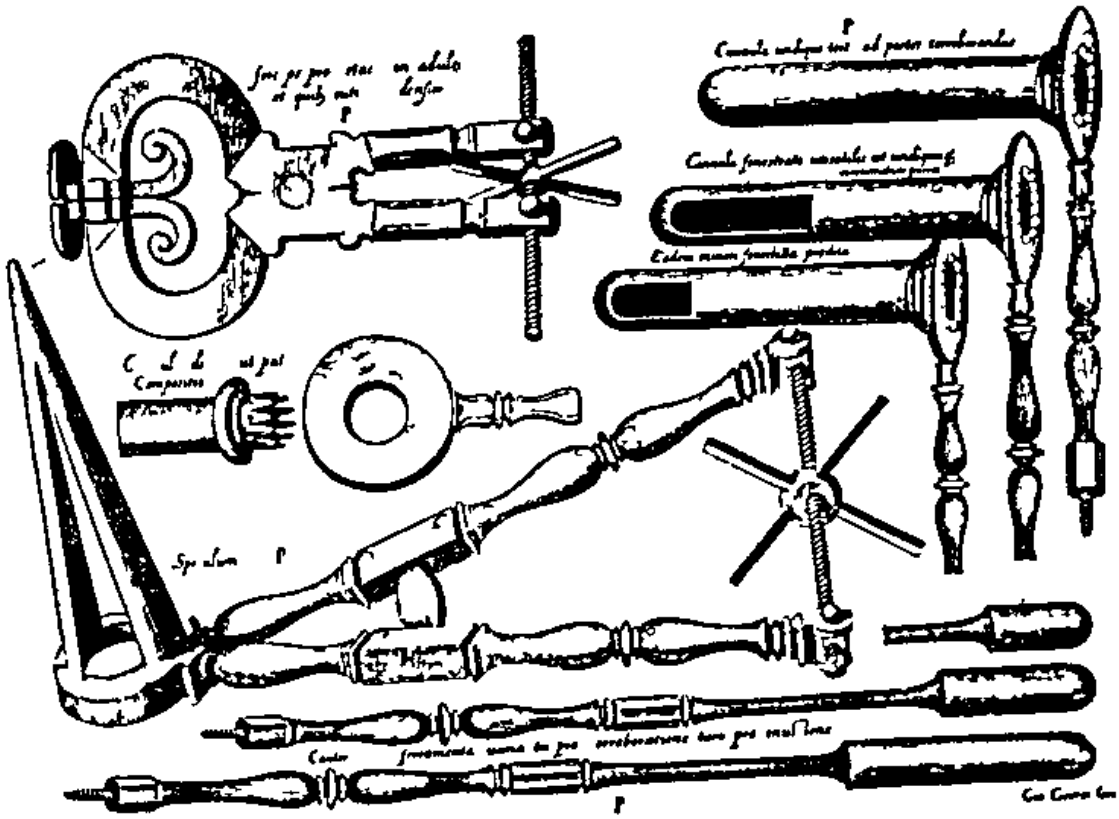
DURING the latter half of the sixteenth and beginning of the seventeenth centuries progress and advancement in medical science entered in Italy and particularly at the great school at Padua which produced many of the great medical men of the period. Among these was Hieronymus Fabricius. Born of a middle class family in Aquapendente in Etruria in 1537, he elected to take up his medical education at the University of Padua. By his application and intelligence he attracted the attention of the then Professor of Anatomy, Gabriel Fallopius and became his special student and assistant both in the anatomical department and in his practice. During this time he began his study of the valves of the veins which though not wholly unknown were but little understood. His enthusiasm for the subject he later transmitted to one of his students, William Harvey, who carried it out to its conclusion and published the discovery of the circulation of the blood in 1628, nine years after Fabricius' death.

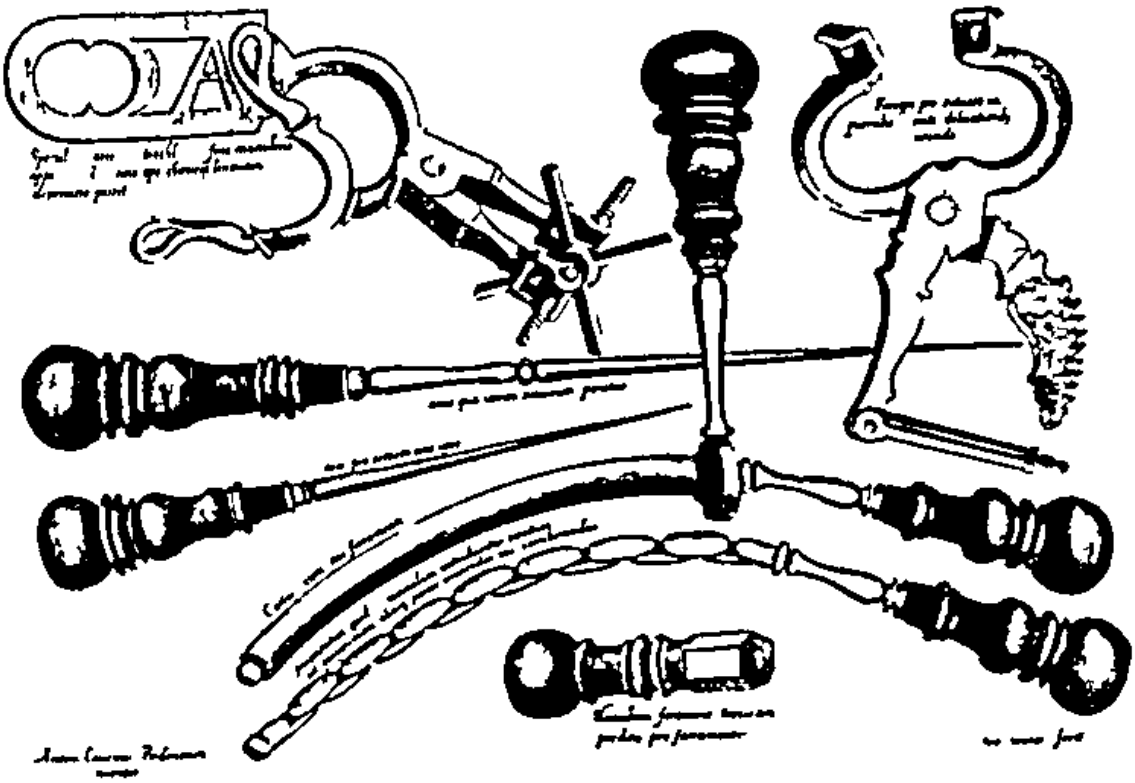
After the death of Fallopius, Fabricius, though only twenty-five years of age, was entrusted with the anatomical demonstrations and three years later, in 1565, was appointed professor of surgery in the University of Padua by the Republic of Venice. Six years later he was appointed professor of anatomy and held the position until 1604, when he relinquished his work at the University and appointed to it his assistant, Giulio Casserio. In addition to his work at the University, Fabricius enjoyed very large practice, possibly because of his sanity and conservatism, and received many honors from his state and his city. He was made a Knight of St. Mark by the Republic of Venice and presented *with a golden necklace and was made an honorary* citizen of the city of Padua. His practice must have been a very lucrative one for he built an anatomical theater for the University at his own expense, maintained near the city a large estate named La Mont'gnola, and at his death in 1619 left a fortune of two hundred thousand ducats.

Fabricius' first surgical work was published in 1592 by Joh. Hartmann Beyer at Frankfort. This was called The Pentateuch (Five Books) of Surgery. These books are entitled I. Tumors, II. Wounds, III. Ulcers, and Fistulæ, IV. Fractures and V. Dislocations. In 1617, two years before his death, the work was published in an enlarged form and the second part, The Operations of Surgery, added. These two works were reprinted many times and the volume must have been considered authoritative for its republications up to 1729.

The general plan of the work differs but little from the other surgeries of the time. The division of the surgery into books or headings is the same as many others but owing to the author's scientific trend of mind and the application of his anatomical knowledge to the clinical field he discards much of the necromancy and spiritualistic and places his ideas on then known scientific fact. He knew the work of the older authors who were considered authorities, Celsus and Guy de Chauliac in particular but it does not hesitate to criticize their opinions when they do not agree with his own observations. The book on tumors contains as all the surgeries of the time inflammations and their sequellæ, swellings of all kinds including oedema and hernia. Among other things it is worthy of note that he was the first to differentiate goiter from other tumors of the neck. In the book on wounds Fabricius describes the ligature of vessels in connection with vascular wounds but does not mention Paré's and as he usually gives credit to previous writers it is probable that Paré's method and teaching had not as yet reached Italy. In connection with fractures he describes and illustrates several complex machines for setting and holding fractures. The illustration of this θαυμάσιον is marvelous to behold. It consists of a finest steel casing with joints moved by turn buckles which apparently fits the patient and holds him rigid. In some of the editions he illustrates apparatus for torticollis, club foot and various other orthopedic conditions.

In the second part of the work, The Operations of Surgery, Fabricius differs from the majority of the surgeons of his time. So much so that he was considered ultraconservative. More than that he had carried his anatomy further than the human and invaded the fields of comparative anatomy and embryology. Therefore such a procedure as castration in herniotomy did not appeal to him and the wholesale disregard of hæmorrhage seemed to him unnecessary. Consequently throughout he constantly aims to perfect his surgical technique and stimulate others to do the same.





REVIEWS OF NEW BOOKS IN GYNECOLOGY AND OBSTETRICS

By GEORGE GELLHORN M D F A C S Saint Louis Missouri

THE literary output in gynecology and obstetrics has been exceptionally rich and variegated within the past few months I am placing at the head of the list of works to be reviewed a new book by Fairbairn[1] because it illustrates to my mind in an altogether admirable manner the new phase in the development of gynecology In 1901 Fairbairn edited with the help of numerous collaborators an imposing volume entitled *Gynæcology and Obstetrics* the great worth of which was recognized in a previous review[2] He has now gone a step further and written a textbook which he calls *Gynæcology with Obstetrics* Gynecology says the author in a lengthy Prologue which is enlivened by a delicious sense of humor cannot be divorced from obstetrics because obstetrics covers the normal and abnormal processes of reproduction and gynecology the diseases and disorders of the reproductive tract From the point of view of preventive medicine a knowledge of midwifery is essential to the proper practice of gynecology and to make it a part of general surgery is to separate the preventive from the curative side This illogical divorce has been strongly advocated especially in America but solely on the narrow ground of technique and without regard to the larger questions of science and education Gynecology can not be classed as either purely medical or surgical for it is both Beyond the problem of the immediate welfare of the individual gynecology coupled with obstetrics is concerned with the study of the whole reproductive cycle—from one generation to the maturity of the next—and by its relations to public health and the social and ethical aspects of the life of the community and the race becomes a fundamental part of the all embracing scheme of preventive medicine Fairbairn would have preferred the title Gynecology had it not been for the traditional usage of the term which restricts it to cover only the *diseases* peculiar to women It seems to me that the word *Greater Gynecology* would correspond to the term *Frauenkunde* which the Germans have coined to express this newer and wider conception of our special sphere of work

But after all what is in a name? Certain it is that Fairbairn has fully succeeded in his task The book is divided into eight parts The first deals in three chapters with anatomy and physiology Then follows the second part of eight chapters on pregnancy normal and abnormal The third part treats of physiological and pathological labor in six chapters the puerperium occupies the fourth the newborn infant the fifth part The next part which is quite extensive is entitled The Diseases of the Reproductive Tract In the chapter on mechanical lesions we find a full discussion of birth traumatisms with cross references to their causation and prevention In the chapter on infections the division into local and general infective conditions leads to unnecessary repetitions and detracts somewhat from the clearness and conciseness of the rest of the book The combination of overgrowth and new growth seems strange at first linking together as it does two entirely different subjects merely on the basis of external appearance but on second thought the arrangement makes a strong appeal from the didactic point of view Throughout this part the pathological descriptions have been restricted to such points as can be observed by the student during his clinical work or are of moment in practice because pathology has its own place in the curriculum its own teachers and examination In the two chapters on operative and other therapeutic procedures obstetrical and gynecological therapeutics are dealt with separately only the essential points are presented the detail being left to be acquired in the only way possible by assisting in the operating theatre or labor ward or by practicing on the model The final part consists of two chapters one on public health service and vital statistics the other on social and ethical questions such as venereal disease occupational disability eugenics and birth control

I have felt that only by a somewhat extensive review can one begin to do justice to a book that with its praiseworthy tendencies its wide outlook upon the subject its delightful style and its frankness deserves to win for itself a host of friends

WHAT Fairbairn teaches in a small textbook Halban and Seitz attempt on an unprecedented scale in their *Biology and Pathology of Woman*[3] How they have succeeded in their task can be fully appreciated only after the projected eight volumes of the work shall be complete in our hands In the meantime I shall merely review several new installments which have appeared since the first three or four sections were reviewed in these pages[4] These installments are published not in logical order but as the manuscripts of the various contributors are sent in This accounts for the wide variety of subjects without a close connection which we find in the installments before us

Guthmann presents a monographic dissertation of almost 100 pages on physiotherapy He is guided by the principle that the treatment should not be

[1] Gynæcology with Obstetrics Textbook for Students and Practitioners By J b S F bairn M A B C h (Oxon) F R C P (Lond) F R C S (Eng) Lond H mphrey Milford Oxford Univ rsity Press 9

S m Gyn & Obs 9 xxi 69

[2] Biology and Pathology of Woman Edited by Hermann Josef Halban and Ludwig Seitz Berlin and Vienna Urban & Schwarzenberg

S G & Obst 9 xxiv 9

relegated to attendants To be successful this form of treatment requires careful individualization and only the physician is competent to make judicious decisions The subject is considered under the headings of mechanotherapy (massage gymnastics pessaries mercury colpeurynter and—strangely incongruous—resuscitation of the asphyxiated newborn and in narcosis) electrotherapy (diathermy thermotherapy) and phototherapy This last section contains among others the various ultra *modern methods of applying light therapeutically* which are as yet hardly known in this country For each physiotherapeutic procedure the theoretical and physiological principles the technique indications and contraindications and finally the results obtained or obtainable are described

Laqueur contributes a very readable chapter on hydrotherapy in gynecology In an appendix the principal watering places in Germany Austria and elsewhere on the Continent and the radioactive springs are considered

An intensely interesting and valuable article on psychotherapy has been written by Walthard a recognized authority in this field Psychotherapy represents a new borderland between gynecology and neurology The subject is not well suited for a brief review but should be studied thoroughly by every gynecologist The psychical etiology of many functional disorders of the genital organs and the principles of diagnosis and psychotherapy are presented in clear and concise language There are however limitations to this therapy which must be realized in time and the gynecologist will have to yield sometimes to the wider experience of the neurologist

Oertel describes the anatomy histology and topography of the female genitals and includes the urinary organs and the intestinal tract as far as they are of practical importance to the gynecologist Emphasis is laid on gross anatomy the histology is treated rather briefly The author denies the existence of the so-called appendiculo-ovarian ligament of Clado *There exists no true interstitial gland in* the human ovary (as claimed by other contributors in other parts of the work what has been designated as such is merely the remnant of atretic follicles Contrary to statements in literature the sympathetic nerves which supply the ovary do not penetrate beyond the cortex

The chapter on the comparative anatomy of the female genital tract in domesticated animals by Schmaltz is as far as I know the first of its kind in a gynecologic work The far reaching importance to the scientific investigator is self-evident Many sexual processes in certain domestic animals are very similar to those in the human and can best be studied in the former dissimilarities on the other hand are due for the most part to anatomical differences After a short general survey *the genital organs* including the mammary gland are described in detail The concluding section deals with special features peculiar to each of the following species horse cattle sheep pig dog and cat

Drahn contributes a chapter on the female genital apparatus in the rat but gain a portrait and mouse which will be welcomed heartily by all animal experimenters The description is based largely on original investigations though the somewhat scattered literature has not been neglected This paper will save the laboratory worker a great deal of effort and expense

Eugenics presuppose among other premises a knowledge of racial differences of peoples The article before us which is limited to racial differences in women has been contributed by Stratz The eminent writer who has published a large number of books on anthropological and ethnographic subjects has died recently The reader will find in *this the author's last work a wealth of interesting* and instructive material Of particular value are his studies on the configuration of the pelvis in lower and higher races The width depth and declination of the pelvis seem to increase in proportion to increasing civilization *In the light of this observation* the small pelvis of the Negress with which we are so familiar in this country assumes a new anthropological dignity Of the genital organs the internal genitals are the only ones which show no racial differences Ovarian tumors seem to be more frequent than fibroids in the yellow races. The artificial deformity of the Chinese foot is never handed down to the offspring

The chapter on the physiology of the genital organs has fallen to Fraenkel—a very natural choice since this author has been one of the pathfinders in the physiology of the ovary It is this particular subject to which he opens his contribution Then follow the physiology of the tubes the uterus the vagina and the vulva In all of these chapters thorough histological studies are reported and depicted Other sub-chapters deal with ovulation and menstruation the internal secretion of the ovary the function of the corpus luteum the innervation of the genital tract the physiology of the secondary *sexual characteristics the postembryonal development* and the senile involution of the genitals. The exhaustive treatise which is enhanced by several beautiful color plates is most valuable for the study of the more recent additions to our knowledge of this fundamental subject. The only criticism that one can make is that Fraenkel—as indeed most of the other contributors—pays so little attention to American and other non German literature

The endocrine glands form the subject of Aschner's essay The author who stands in the front rank among endocrinologists deals in the physiological part with the influence of the endocrines on the female genitalia and *vice versa* under normal conditions. In the pathological part the relationship between endocrines and the constitution and its anomalies *and the effect of endocrine diseases* on genital functions are discussed There is, in this article an immense amount of material which testifies to the encyclopædic knowledge and the amazing industry of the author At the same time it bears a strong

individualistic stamp and contains views which are bound to meet with objections For this very reason the study of this contribution is intensely stimulating

The scientific investigator will find much valuable information in Keller's report on the comparative physiology of the sexual organs in domestic and experimental animals The phenomena of rut and its relation to ovulation furnish the basis for comparisons with the corresponding occurrence in the human female

Lenz points out in his essay on race hygiene and heredity how the gynecologist may contribute to the study of eugenics The difficult yet exceedingly important subject is presented with praise orthy simplicity Mendel's law applies to the human Sex determination is produced through the male germ and may be influenced at will whether his purely theoretical suggestions have any practical value seems rather questionable to me The predominance of male over female births is explained like wise the higher fetal mortality of boys The author presents the mode of hereditary transmission of constitutional anomalies contracted pelvis tumors etc Operative sterilization and interruption of pregnancy are often desirable for eugenic reasons race suicide need not be feared For pressure to X rays is very apt to exert a deleterious effect upon the progeny Radiologists as a rule belong to a class which is of great eugenic value and should therefore be protected For this reason only those who are beyond the reproductive age or otherwise incapable to procreate should be admitted to the occupation From this brief selection it is easy to gauge the absorbing interest of the article

The thesis by Lentz is supplemented in a way by a chapter on women in industry and gynecological diseases Hirsch the well known protagonist for social gynecology adduces numerous proof to show the untoward effect of industrial work on the birth rate and on the morbidity and mortality of the working women themselves The influence of industrial occupation on child en adolescents and constitutionally inferior individuals bears an equally close relation to the problem of eugenics The article with its numerous tables and curves is very largely the product of original investigations Its lessons should become the common property of all gynecologists and the medical profession in general It may then become possible perhaps to remedy some of the evil of modern industrial life in our female population

A carefully written chapter on hygiene of pregnancy and the non pregnant state is contributed by Basch The principles of hygiene are laid down for all ages of the individual—from birth to senescence—according to the most modern and generally accepted conclusions of our knowledge It is natural that puberty pregnancy and the climacterium should receive the most detailed presentation Proper nutrition clothing exercising conditions and even cosmetics are considered The general object of any hygiene of women is this to prepare the female organism for its great physiologic tasks of pregnancy labor and the rearing of children and after the reproductive age has been reached to preserve the undisturbed exercise of these functions

EVERY textbook on gynecology contains at least one chapter on radiotherapy and there are a number of monographs in various languages which deal with certain circumscribed aspects of the subject Thus far however we have had no textbook in which gynecologic radiotherapy was presented in its entirety Ernst von Seuffert[1] has now undertaken to fill this gap and as he is both an expert radiologist and an experienced gynecologist—a very rare combination indeed—he appears pre eminently suited for his task He addresses himself to three categories of readers the practitioner who himself does not apply deep therapy but desires to advise his patients intelligently to the physician who contemplates using radiotherapy and to the radiologist to whom the clinical experiences obtained in the large and splendidly equipped clinic of Doederlein in Munich should be of value

The work itself is divided into two large sections The first of 310 pages deals with the physics and technique of radiology and comprises an exhaustive discussion of natural radioactive rays (radium mesothorium) and artificial gamma rays (X ray apparatus) There is also a description of the various methods and appliances to measure the quantity and quality of rays and of the fundamental factors in the therapeutic dosage in gynecology The technique evolved in the principal German clinics is given in full

The last 230 pages present the biologicoclinical part A discussion of the effect of radiation upon the living cell illustrated with a number of histological pictures is followed by one on the practical application and the determination of the therapeutic maximum and minimum dose as found by clinical and experimental study The concluding chapters are devoted to the uses of radiation in gynecological diseases both malignant and benign and its advantages as a preoperative and postoperative procedure

It is this clinical section which is of particular interest to the gynecological reader There is for example a curious difference in the reaction of various individuals to X rays Women with auburn hair are apt to get erythema from minimal doses In syphilis nephritis and diabetes and in certain rare diseases such as acromegaly the general radiosensitivity is decidedly increased Certain parts of the body are more easily burned than others A coexistent exophthalmic goitre may be made worse by radiation of the pelvic organs On the other hand desirable by effects were noted in the immediate and lasting relief of constipation the shrinking of

[illegible]

vaginal prolapses etc Pressure symptoms from large fibroids impacted in the pelvis were relieved almost instantaneously even before a shrinkage of the tumor could be detected by palpation Only a very few complications of fibroids (adnexal tume factions *pedunculated submucous polyps necrosis* or gangrene) call for operation In all other cases radiotherapy is preferable An excessively large size need no longer deter us nor the fear of later sar comatous degeneration which in itself is particularly amenable to radiation Cancer of the cervix is *treated exclusively with radium (and mesothorium)* in Doederlein's clinic and the prospect of cure is even now almost twice as good as it was under the best possible circumstances after operation

This categorical statement makes us suspect that his enthusiasm possibly makes the author too positive *in his assertions and indeed the clinical part* of the book supplies more than one reason for such an assumption Enucleation of fibroids for instance is advised against as probably being useless in relieving sterility or dangerous should conception occur because of possible rupture of the scar From numerous *personal experiences I take exception to this* statement and I am certain that many others will agree with me Again radiation in small stimulating doses is recommended in the treatment of amenorrhœa dysmenorrhœa and sterility—a proposal which impresses me as premature in view of *the very meager data at hand*

While therefore the book should be read with critical judgment—a postulate which of course applies to any scientific work—it may safely be pronounced an intensely interesting thorough and decidedly worthwhile study

IT is a well known fact that modern X ray treatment of uterine cancer owes much of its present state of perfection to the joint studies of Wintz and Seitz in the Erlangen clinic The details of their method are now presented by Wintz in book form and as the work is intended for radiological experts familiarity with questions of dosage and apparatus is taken for granted The brief introduction contains practical hints concerning pre radiation and post radiation treatment technical preparation for radiation auxiliary measures of exposure copper ionization etc. The bulk of the book is made up of fifty good reproductions of photographs which clearly demonstrate every step of the Erlangen method and which are accompanied by short explanatory descriptions The author aims at providing a foundation for the X ray treatment of typical cases which should be modified to fit the exigencies of the case

THAT Falta's book[2] is one of the fundamental works on endocrinology and indispensable for any exhaustive study on the subject has been emphasized in a previous review[3] In the new edition before us the title has been changed to Endocrine Diseases In other respects the arrangement of the book remains unaltered After an introductory general consideration of the ductless glands in *health and disease the diseases of the various gland* are discussed in separate chapters and there are further chapters on conditions which do not fit well into the classification adopted such as infantilism chondrodystrophy obesity etc An enormous mass of material has been collected by the author from *the literature as well as from personal researches* At the end of each chapter there is an Addendum in which the editor has compiled the American and English literature on the topic under discussion The book is thus brought up to date Unfortunately the translation of the German text is altogether too *literal both as to single expressions and the con*struction of sentences This renders the reading unnecessarily difficult frequently obscures the meaning and in general detracts from the appeal and the usefulness of the work

IN *making each individual endocrine gland a sub*ject of information which is the usual mode of presentation in textbooks on endocrinology it is rather difficult to give to the student a unified picture that will clearly show the meaning of the internal secretions in the life cycle For this reason Weil approaches his subject in a different manner[4] He deals with the internal secretions—he proposes for these the term incretions —as agents concerned in the production and regulation of the separate bodily functions and describes the part which the various incretions take in each particular life process This then is *primarily* a physiology of the internal secretions though the application to pathological alterations is either self evident or expressly pointed out by the author and a glance at the Table of Contents will make his plan still clearer We find there a chapter on the physiology of the blood others on the circulation of the blood respiration and voice production metabolism growth and bodily form the mind and the internal secretions methods of testing for internal secretions etc The author evidences everywhere the complete mastery of his subject the intimate knowledge of the literature of the world and the critical judgment that are demanded to give to the reader a firm foundation for further study The book should therefore be most welcome to students and practitioners and this appraisal seems fully confirmed by the fact that in little more than two years three German editions have become necessary Its value to the specialist is inferred from some of the chapter headings mentioned The gynecologist will find all the known facts about the rôle of the endocrines in his particular field in the chapters on reproduction and the

[2] DIE KRANKHEITEN DER BLUTDRÜSEN By Prof Hermann Falta M D Ph D Leipzig Georg Thieme 1914

[3] ENDOCRINE DISEASES THE INTERRELATION OF THE DUCTLESS GLANDS AND THEIR EFFECTS THROUGH THE BODY By Wilhelm Falta M D 3d ed Philadelphia P Blakiston Son & Company

[4] SUR LA SECRÉTION INTERNE By Dr Ath Weil Adapted from the 3d German ed by Jacob Gutman M D Ph D F A C P New York The Macmillan Company 9

sexual impulse but the other chapters too—notably those on metabolism and bodily growth the latter with its sub headings on pelvic girth secondary sex differences transformation of sex and hermaphroditism—will offer him many a valuable suggestion It is a fascinating book which can not be recommended too highly Previous translations into Russian Spanish and Japanese have now been followed by an English translation which is so purely idiomatic that its character of a translation becomes apparent only upon the title page The translator has rendered a distinct service to the English reading public and he has added an æsthetic enjoyment to the mental stimulation of the original

TIMME presents in unchanged form his Lectures on endocrinology[1] which appeared in the *Neurological Bulletin* in 1911 The author deals with each of the endocrine gland separately in the accepted order but he injects a new point of view into the discussion by describing the activities of the endocrines in relation to the three spans of the human life cycle one from birth to puberty the next from puberty to the prime and the last through a gradual deterioration to dissolution He also takes pains to point out again and again the intimate interrelationship of all endocrine glands which comes into play in many morbid states and makes it extremely difficult and often impossible to determine the original gland at fault It is unavoidable that in a subject concerning which knowledge is being as rapidly accumulated as in endocrinology these lectures do not embody the information acquired in the last three years But as Timme is a master of literary style his little book makes reading most enjoyable and prontable and deserves a wide circle of readers

PRURITUS is so distressing a symptom and very often so refractory to treatment that any new information regarding its relief can only be welcomed The subject however is so circumscribed that it may suffice for a magazine article or a chapter in a textbook but should not fill an entire book This difficulty is encountered by Montague and in order to cover 186 pages the author has been led to frequent repetitions to the detailed introduction of irrelevant matter and to branching out into discussions which are not germane to the subject When all superfluous and extraneous matter is excluded there remain a number of excellent photomicrographs and other pictures and a good consideration of pruritus from the standpoint of the proctologist To the gynecologist the book will prove inadequate Not only are some of the most important general causes such as diabetes not stressed sufficiently but the enumeration of specifically gynecological causes is incomplete There is for instance no mention made of kraurosis and leucoplakia of the vulva or of lack of cleanliness smegma pediculi pubis etc In the historical introduction no word is said about the fundamental histologic studies by J Clarence Webster in 1891 and Kelly's classical description in his Medical Gynecology is ignored Among the gynecological causes cited by the author there are several which can not be accepted without objection For example cystic ovaries and chronic salpingitis are not apt to cause pruritus The author believes that when senile changes occur in the uterus in menopause the utricular glands become hyperactive and fluid is retained in the uterine cavity That this is a misconception need not be pointed out to gynecological readers The author probably had in mind the picture of senile vaginitis a very common cause of pruritus which however is due to desquamation of the upper layers of the vaginal mucosa and insufficient regeneration of the basal layer

The book ends with a recommendation of operative treatment for which the author has designed an original method

TWO textbooks on obstetrics for nurses have appeared in new editions Both Reed[3] and Bacon[4] present the matter in very clear and concise language and simplify the issue still further by avoiding all controversial questions and introducing only a minimum of theoretical considerations It has been argued against nurses textbooks written by physicians that they teach too much and it must be admitted that on the whole there is but little difference between the books before us and any students textbooks of small size In fact Bacon maintains that the rank and file of the profession really need not know more than he offers and so he designates his book A Manual for Nurses and Students and Practitioners of Medicine While thus there seems to become ground for an adverse criticism it must be remembered that in obstetrics almost more than in any other branch of practical medicine there is an exceptionally wide *field for the* initiative of the nurse It is she who has to watch the patient for hours before the doctor arrives and in sudden complications (bleeding convulsions etc) she may have to administer first aid unless the patient is in a hospital and under observation by the house staff She therefore *must* know more than the mere routine of nursing and for this reason books like those before us answer a distinct want From actual observations in daily practice however we need not fear lest these and similar books that the nurse will learn too much

FROM Talleyrand's famous dictum La statistique c'est un mensonge en chiffres to the more recent assertion that by statistics you can prove anything—even the truth *there is hardly*

[1] Lectures on Endocrinology By William Timme MD New York E B Hebner 1911

[2] Pruritus Its Causes and Treatment By Joseph Eastman Montague MD With a foreword by George Emerson Brewer MD New York E B Hebner 1911

[3] Obstetrics for Nurses By Charles B Reed MD Fourth edition Philadelphia and London W B Saunders Company 1911

[4] Obstetrics for Nurses and Mothers By Charles Eugene Bacon MD Second revised edition Philadelphia and New York Lea & Febiger 1911

a single epithet of an opprobrious nature that has not been applied to statistics at one time or another Yet by statistics we live and by statistics we die if the life insurance statistics by which our premiums are determined have any significance and in medicine in particular we swear by statistics even though we may grumble at times that they are not worth a tinker s dam Pearl believes that the time has come to introduce exact scientific methods into the collection and tabulation of medical thought and action This book says the author is written for the medical reader primarily The illustrations of method are mainly chosen from that field Biometric methods already have a secure place in general biology Their use is devoloping in the medical field with extraordinary rapidity just now It has seemed to me on this account that an elementary introduction to the subject designed primarily and directly for medical readers might be found particularly useful at this time To the average clinician who like myself has heretofore used and computed figures rather lightheartedly the book opens a vista into an unknown territory The historical prologue is immensely interesting but the reading soon becomes more difficult At times it is as thrilling as a page of logarithms and forgotten memories of school mathematics have to be revived to follow the author on his way through rates and ratios life tables the measurement of variation and of correlation etc and to understand the importance of avoiding the probable error Pearl is professor of biometry and vital statistics in Johns Hopkins University and his work will in time bear fruit in the greater reliability of medical statistics

Introduction to Medical Biometry and Statistics By Raymond Pearl Ph D Professor of Biometry and Vital Statistics in the Johns Hopkins University Author of Studies in Human Biology Cloth Pp 260 with 30 illustrations Philadelphia and London W B Saunders Company 1923

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